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FINITE ELEMENT ANALYSIS OF THE ADP/COMMUNICATIONS SHELTER

DTNSRDC/CMLD-78/15

**DAVID W. TAYLOR NAVAL SHIP  
RESEARCH AND DEVELOPMENT CENTER**

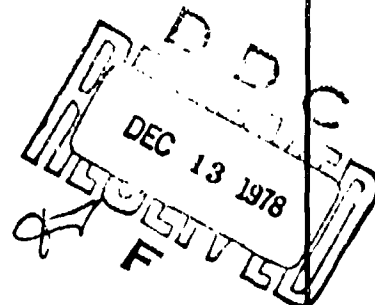
Bethesda, Md. 20084



FINITE ELEMENT ANALYSIS OF THE  
ADP/COMMUNICATIONS SHELTER

by

Petro Matula and Erwin A. Schroeder



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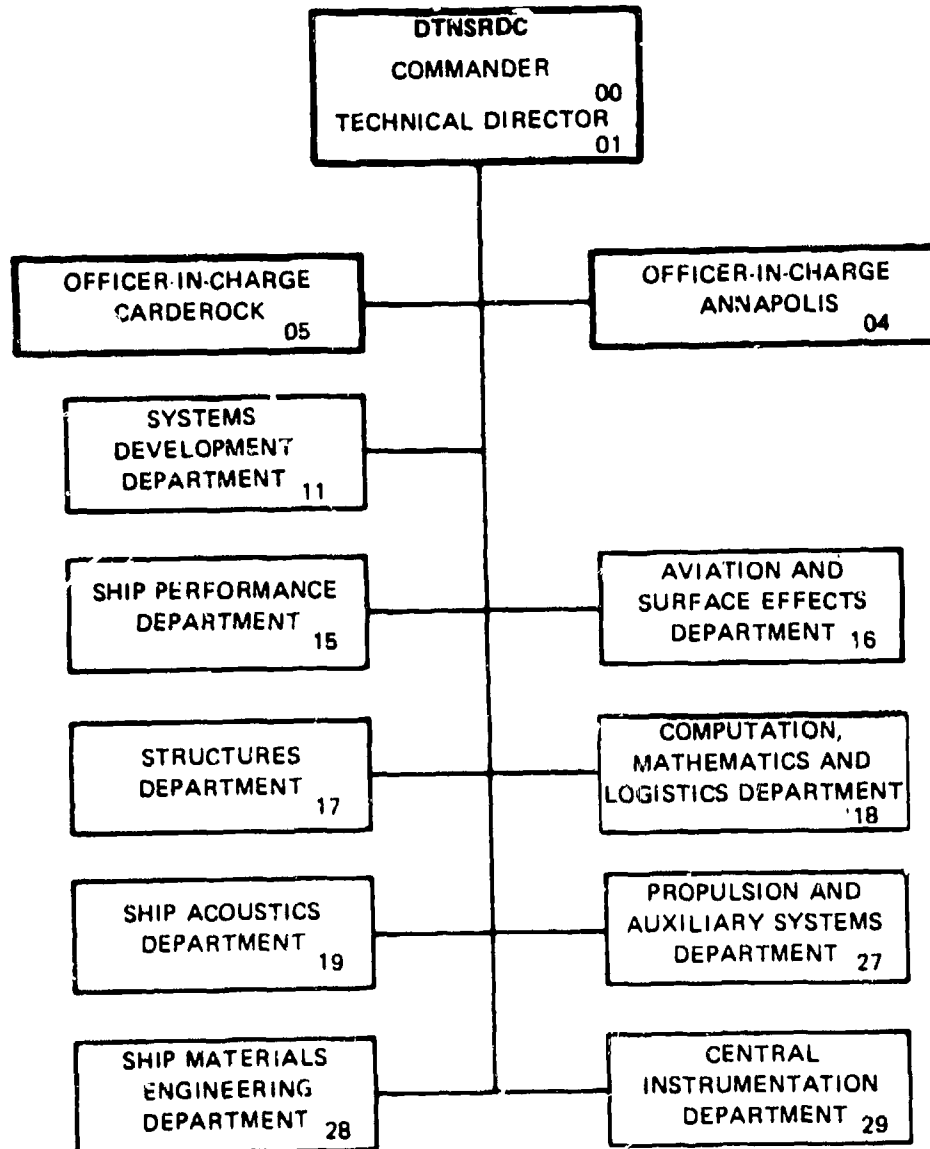
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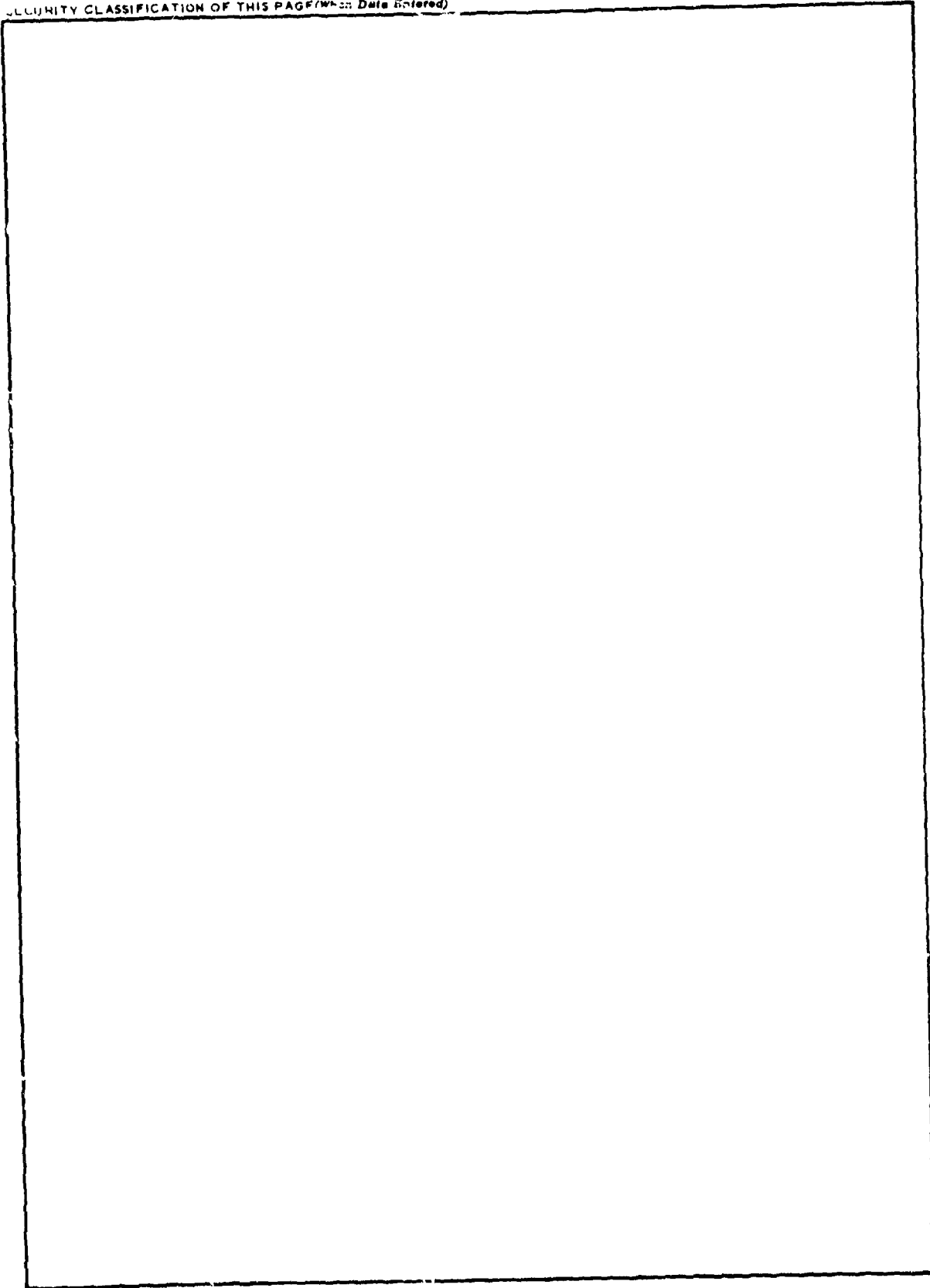
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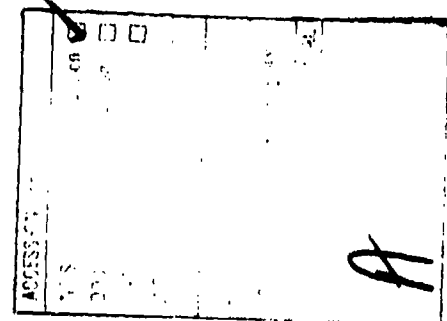
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## ABSTRACT

The Navy NASTRAN Systems Office at the David W. Taylor Naval Ship Research and Development Center assisted the Naval Surface Weapons Center, Dahlgren Laboratory, in the structural analysis of the ADP/Communications portable computer shelter. The original and reinforced shelters were modeled with finite elements and the analysis was carried out using the computer program NASTRAN. The results of the analysis showed that the average stress in the floor of the shelter decreased 20% after the shelter had been reinforced.

## ADMINISTRATIVE INFORMATION

This work was funded by the MAGIS office of the Naval Surface Weapons Center.

## INTRODUCTION

The Navy NASTRAN Systems Office, Code 1844, of the David W. Taylor Naval Ship R&D Center (DTNSRDC) was requested by the Naval Surface Weapons Center (NSWC) to assist in the analysis of the ADP communications portable computer shelter (ADP/Comm shelter). The purpose of this analysis was to evaluate the shelter's structural strength when it is subjected to various loads as specified under its transportability requirements.

First, the original shelter was analyzed. Then NSWC reinforced the original shelter on the basis of the analysis results, and this modified shelter was analyzed anew.

In this report the term "original" shelter refers to the shelter design received by DTNSRDC for analysis. The term "modified" or "reinforced" shelter refers to the shelter which resulted from modification of the original shelter. (The floor of the original shelter had already been modified when the shelter was first received by DTNSRDC.)

The analysis was performed by the finite element method using the computer program NASTRAN.

This report describes the work performed.

## SHELTER DESCRIPTION

The shelter is an aluminum structure, approximately 8 feet wide by 20 feet long by 8 feet high (see Figure 1). It is made up of wall, roof, and floor panels. These six panels are joined along the edges to form the shelter enclosure. Figures 2, 3, and 4 show the connections between panels. The framework of these panels is made of tube beams with rectangular cross sections and with formed hat sections. The joists of the floor panel are braced with intercostals which also provide additional support to the floor. The floor panel is about four inches thick and is covered with aluminum skins 0.04 inches thick on the underside and 0.125 inches thick on the upper side. The roof and wall panels are about two inches thick and are covered with 0.04-inch thick aluminum skin. Approximately 1/4-inch thick wood spacers, as thermal insulation, are provided between the inner skin of the panel and its framework. The space between the skins in each panel is filled with a rigid foam insulation.

The shelter has a 3-ft. by 6-ft. main door located toward one end of one longitudinal wall and a 1.5-ft. by 6-ft. emergency door located in the other longitudinal wall diagonally opposite the main door.

The shelter has skid rails under the floor, wire rope sling attachments on the roof corners for helicopter lift and for tying down the shelter during rail transport, and pads and fittings at each end of the shelter for attachment of two-wheel trucks ("mobilizers") for road transportation.

The ADP equipment of the shelter is attached at strong points of the floor and the walls. Figure 5 shows an interior view of a partially equipped shelter.

## STRUCTURAL AND EQUIPMENT MODIFICATIONS OF THE SHELTER

The general description of the shelter presented in the previous section applies to both the original and the modified shelters considered in this report. They differ only in details as described in this section.

As a result of the stress analysis of the original shelter NSWC strengthened the original shelter along corner joints and at the equipment attachment points. The modification of the corner joints can be seen in



Figure 1 - ADP/Communications Shelter



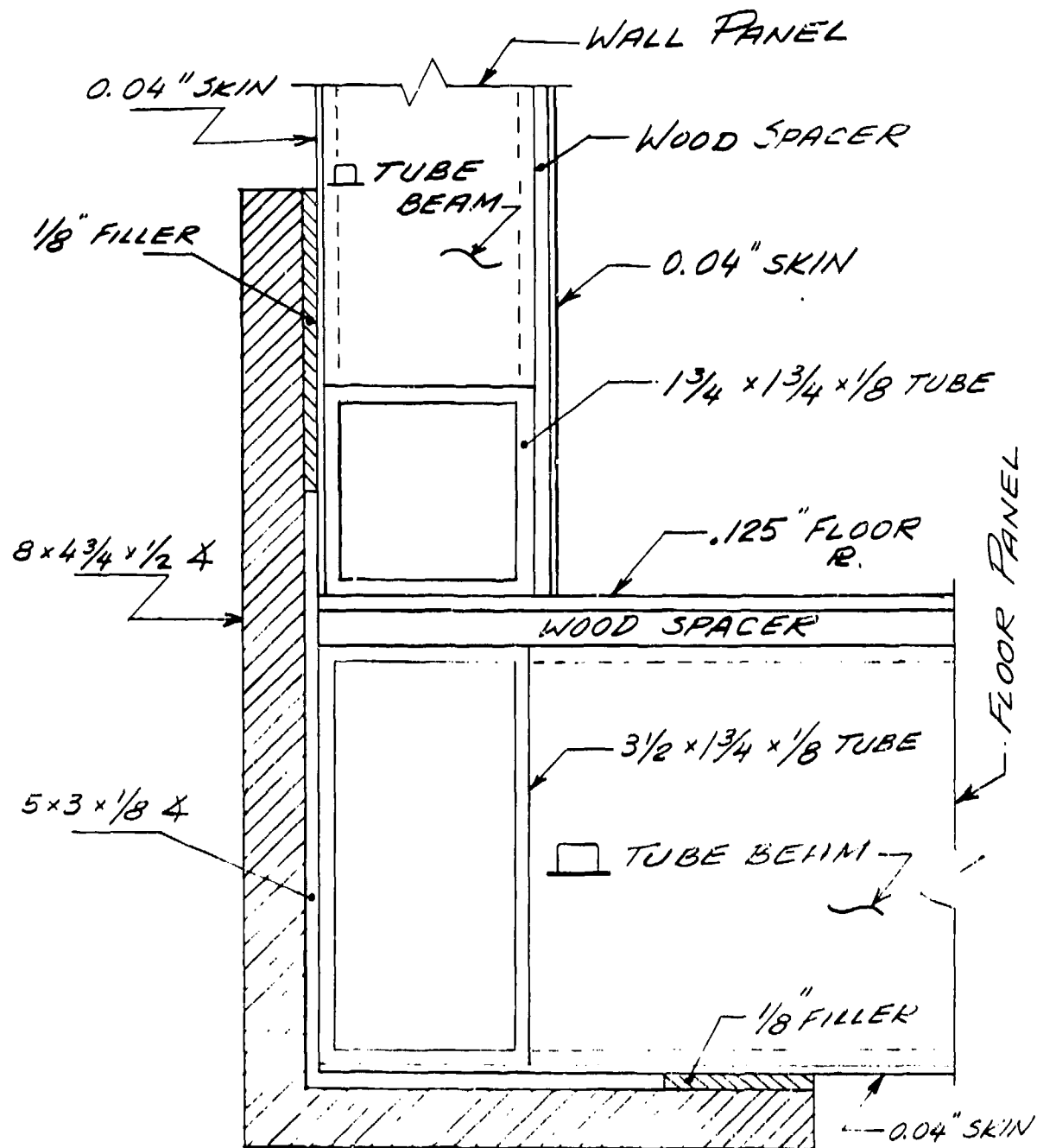


Figure 2 - Floor to Wall Joint, Reinforced  
(Shaded Parts are Reinforcements)

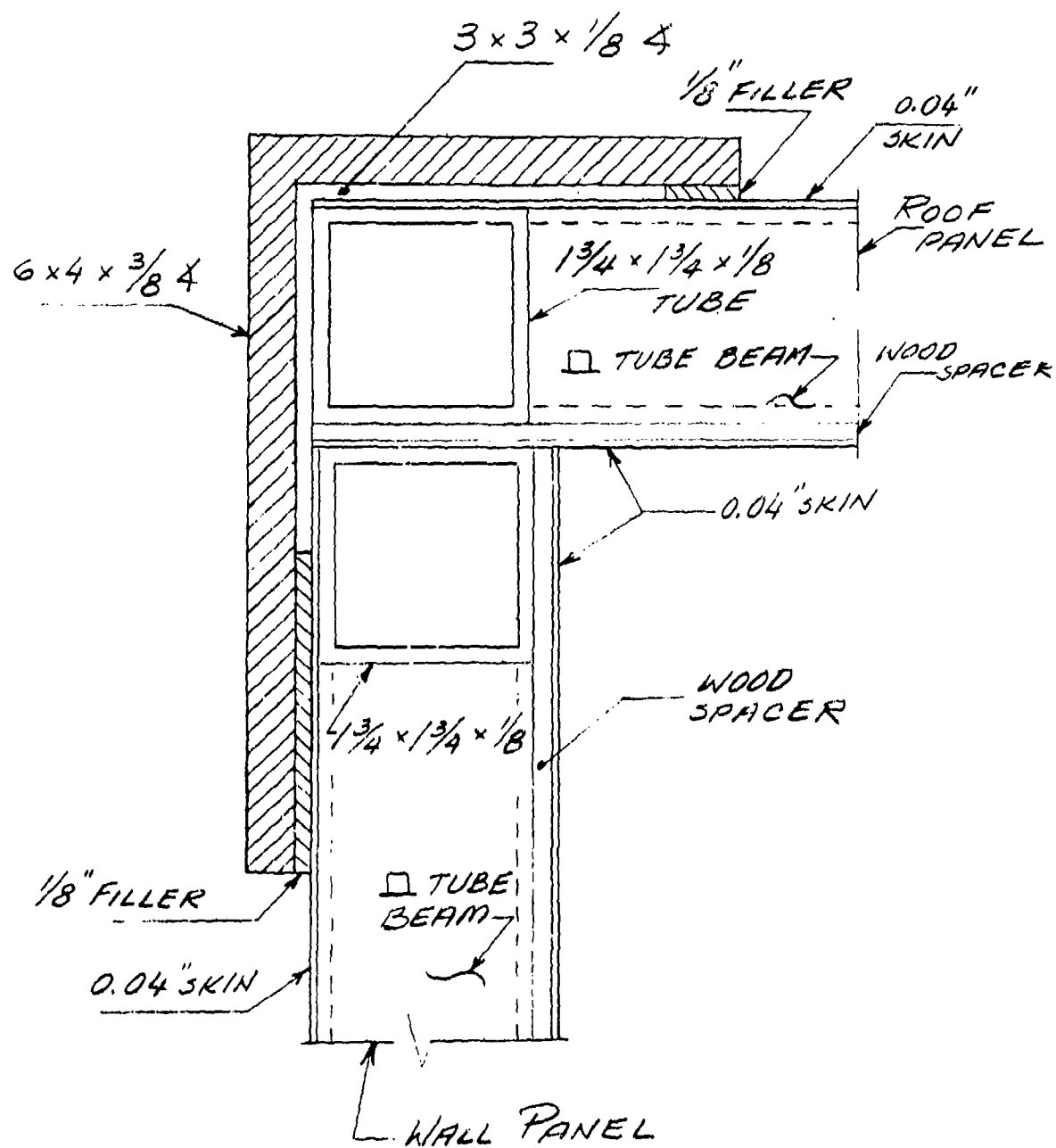


Figure 3 - Roof to Wall Joint, Reinforced  
(Typical, except Roof to A/C End Wall (see  
Fig. 6). Shaded Parts are Reinforcements.)

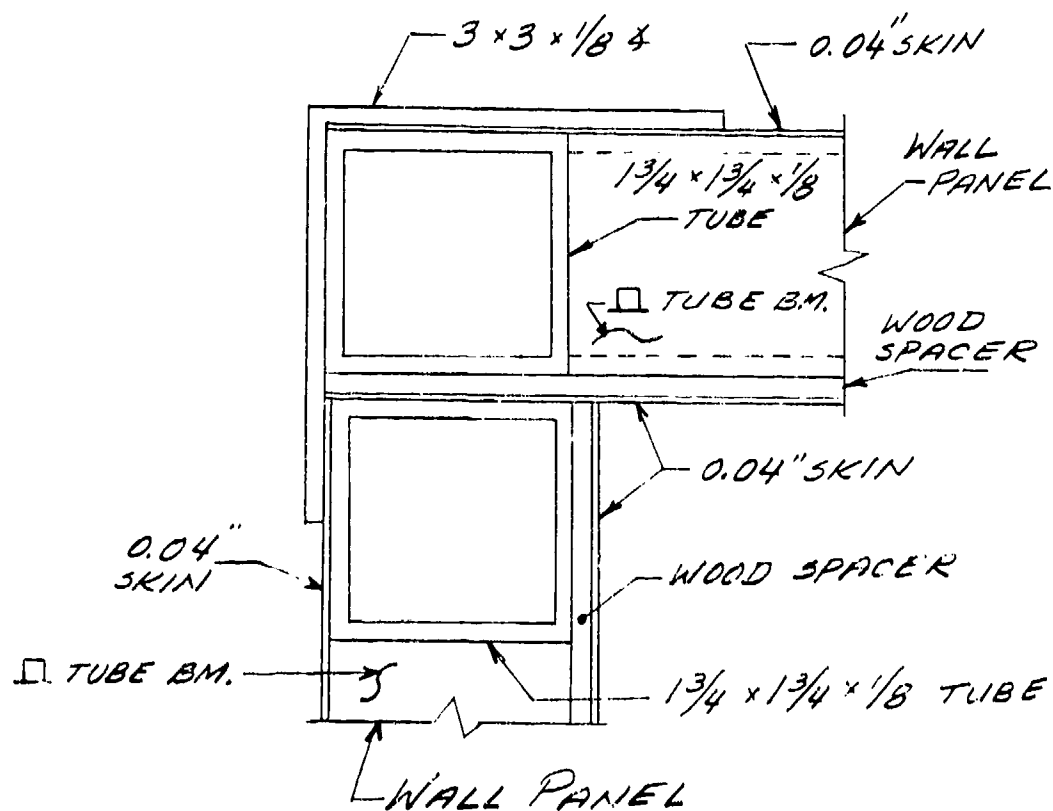


Figure 4 - Wall to Wall and Unreinforced Roof to Wall Joint



Figure 5 - Interior of ADP/Communications Shelter

Figures 2 and 3; the 8 x 4 3/4 x 1/2-inch and 6 x 4 x 3/8-inch angles and the associated 1/8-inch filler plates are the additions (shown shaded) to the original corner joint configuration.

The equipment mounting points were reinforced by adding beams running transversely to and connected to floor joist beams and wall stud beams under and behind the equipment.

In addition to structural modifications, some of the internal equipment was relocated and its anchorages modified.

These changes were accounted for in the finite element model of the modified shelter.

#### FINITE ELEMENT MODEL

The finite element model of the shelter was produced by modeling each wall, roof, and floor panel with NASTRAN plate and beam elements. The complete finite element shelter model as plotted by NASTRAN is shown in Figure 6. The plate elements and the grid points of the finite element model are located on the neutral plane between the inner and the outer skins of each panel.

The shelter was modeled in a rectangular coordinate system with the origin at the point of intersection of neutral planes of the main door wall panel, the air conditioning (A/C) end wall panel, and the floor panel.

The plate elements used were the NASTRAN quadrilateral QUAD1 and triangular TRIA1 elements. Because these elements allow separate specification of plate properties for bending, shear, and membrane actions, they can be used to model the skins. The effective thickness for shear and membrane action is equal to the sum of the thicknesses of the inner and outer skins. The bending stiffness is computed by treating the panel as a sandwich plate in which the two skins are separated by foam insulation.

It is assumed that the insulation between the skins prevents the skins from buckling but does not contribute directly to the strength of the panels.

NASTRAN's beam elements, BARS, run between the grid points. However, whenever a beam end does not coincide with a grid point, NASTRAN allows

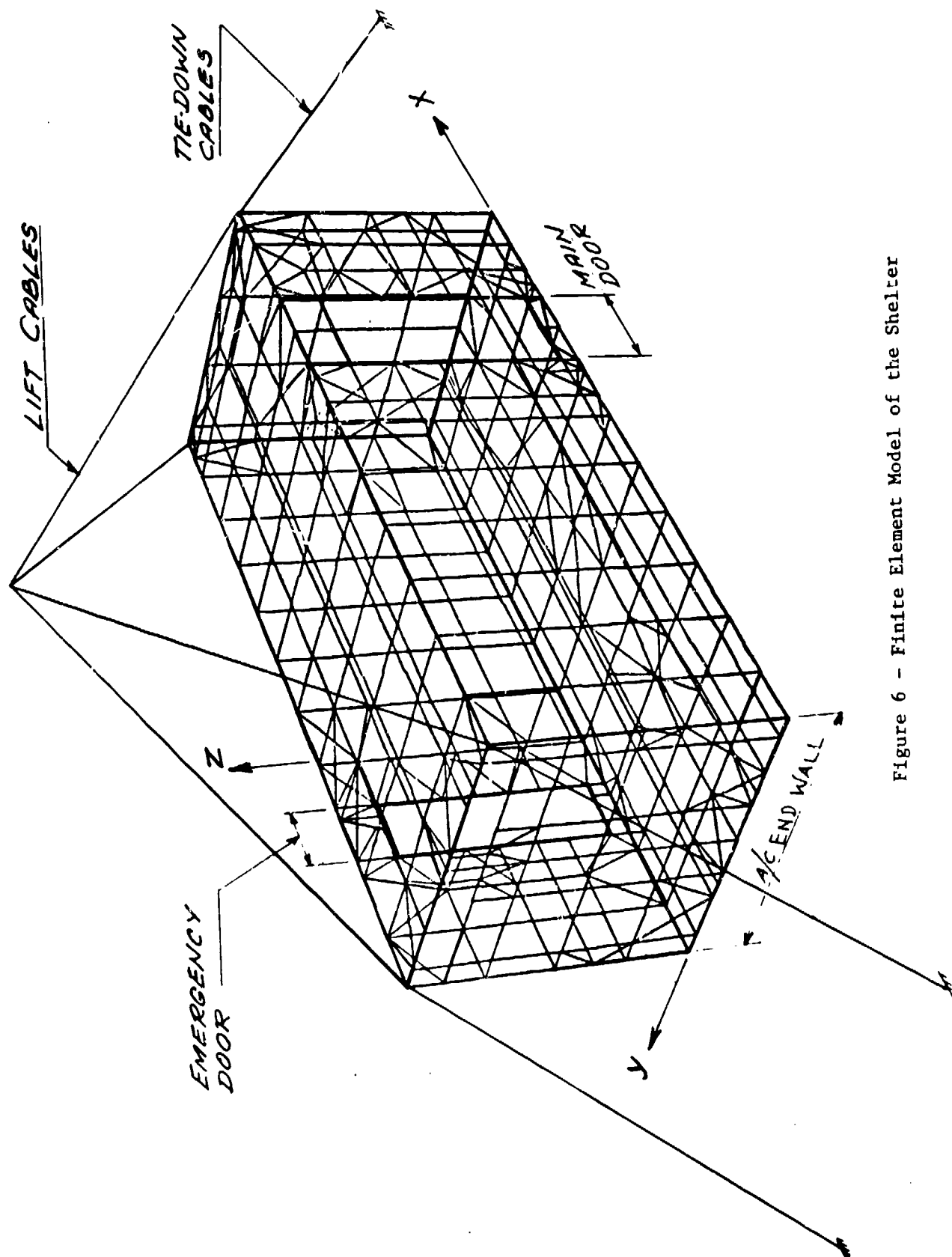


Figure 6 - Finite Element Model of the Shelter

specifying the offset for that beam end from its respective grid point.

Most of the beams of the shelter model are located at various offset distances from their respective grid points. Such offsets, however, do not show on plots done by NASTRAN plotting subroutines. Such plots show the BARS connecting grid points directly.

The tie down and helicopter lift wire rope cables are modeled with NASTRAN ROD elements. These elements possess axial and torsional stiffness only. For proper simulation of wire ropes the use of RODs in the shelter model is limited to axial tension.

The absence of bending stiffness in ROD elements made it possible to retain them in the finite element model even for those analyses which did not involve the cables. In such cases, the cables (RODs) were neutralized by a combination of proper boundary conditions and the absence of resistance in RODs in bending.

The ability to retain the same finite element model for various analysis conditions means that the stiffness matrix of the model did not have to be computed each time the cables were removed or added. This is important in reducing the cost of the analysis since the computation of the stiffness matrix is one of the more expensive computer operations.

The finite element model of the original shelter consists of:

- 382 grid points
- 2292 degrees of freedom (before constraints)
- 2210 degrees of freedom (after constraints)
- 218 rectangular plate elements, QUAD1
- 207 triangular plate elements, TRIA1
- 808 beam elements, BAR
- 8 rod elements, ROD

and the complete finite element model of the reinforced shelter consists of:

- 384 grid points
- 2304 degrees of freedom (before constraints)
- 2121 degrees of freedom (after constraints)
- 215 rectangular plate elements, QUAD1
- 211 triangular plate elements, TRIA1
- 877 beam elements, BAR
- 8 rod elements, ROD

## LOADS AND BOUNDARY CONDITIONS

The shelter is required to withstand several kinds of dynamic loads. However, the normal mode analysis results indicated that these dynamic conditions could be simulated by static loads as follows (see also Normal Mode Analysis section):

1. The Simulated "Rail Hump" - combines 20-g vertical and 30-g horizontal loads. The horizontal load acts along the longitudinal dimension of the shelter. With the vertical load acting upward, the horizontal load was allowed to act first on one end of the shelter and then on the other end, to provide for the possibility that either end of the shelter might be forward during a rail hump. The same two horizontal loads were applied with the vertical load acting downward. Thus there were four distinct cases to be analyzed.

With the vertical load in the upward direction, the shelter was constrained at the upper four corners by tie-down cables (Figure 6). With the load acting down, the shelter rested on the skid rails.

To resist the horizontal load the "front" lower edge of the shelter rested against blocking and was prevented from overturning by the two "rear" tie-down cables.

2. The flat drop condition was simulated by a 20-g load acting downward with the shelter resting on the skids.
3. The helicopter lift was simulated by a 4-g load acting downward with the shelter suspended by sling cables attached to the four upper corners (Figure 6).

## NORMAL MODE ANALYSIS

The shelter was analyzed for normal modes below 50 hertz. For this analysis the shelter was modeled as supported at the mobilizer attachment points to simulate the boundary conditions during ground transportation.

The results were compared by NSWC with shelter dynamic test data as well as with the specified time-dependent load functions to assure adequate separation of normal and input frequencies to avoid resonance.



The information thus derived helped to specify a static design load in place of a dynamic condition. The frequency of the fundamental mode of the original shelter was found to be 11.5 hertz. The vibration mode corresponding to this frequency is shown in Figure 7.

#### NASTRAN OUTPUT DESCRIPTION

Pages 18 through 33 contain samples of NASTRAN shelter analysis output, which consists of two parts: (1) complete listing of the input data, and (2) analysis results as requested. The parts are described in this section.

##### INPUT DATA

The input data listing is grouped as follows:

- a. Executive Control Deck, page 18, defines the job and the type of analysis to be performed as well as many other conditions and requirements that a user may specify for his job.
- b. Case Control Deck, page 19, defines a subcase structure for the problems, selects data from the Bulk Data Deck, and requests printed, punched, or plotted output. The Case Control Deck of the shelter problem contains six subcases. Each subcase specifies one of the prescribed load conditions for analysis as labeled. These labels and subcase numbers in the input data are used to identify the pages of analysis output.
- c. Bulk Data Deck, beginning on page 20, is the primary NASTRAN input. This deck defines the structural model and various pools of data which may be selected by case control at execution time.

The shelter structure and the data for analyzing it are specified by the following alphabetically listed cards. For the specific format and requirements of the data cards, see the NASTRAN Users' Manual.<sup>1</sup>

- CBA' gives the grid point connections for the beam element, BAR, with axial, bending, torsional, and shear stiffness.
- CONM2 concentrated mass used to represent the mass of internal equipment.

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<sup>1</sup> "The NASTRAN Users' Manual," NASA SP-222 (03), National Aeronautics and Space Administration, Washington, D.C. (1976).

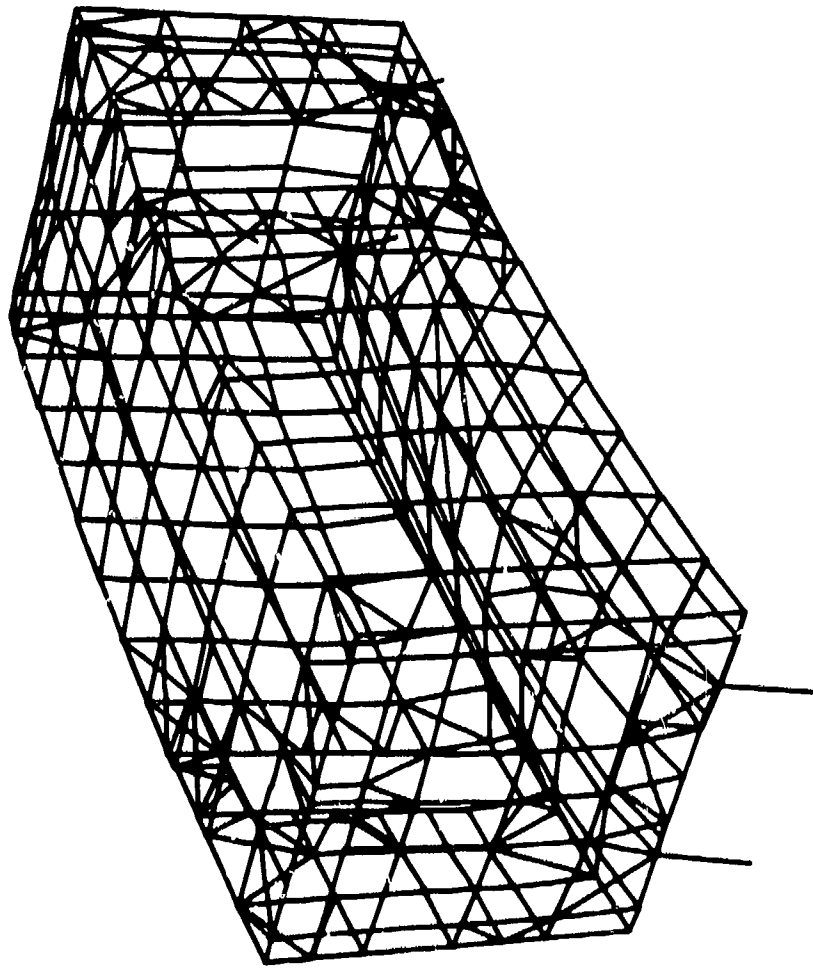


Figure 7 - Fundamental Vibration Mode of the Shelter

CQUAD1 connections for rectangular plate elements that represent the two skins on the panels.  
 CQUAD2 connections for rectangular plate elements used to represent panels.  
 CRIGD1 defines rigid connections between internal components of the shelter.  
 CRIGD2 rigid connections that represent mounting of the two doors by hinges and latches.  
 CROD connections for rod elements that are given only axial stiffness. Used to represent tie-down and lift cables.  
 CTRIA1 connections for triangular plate elements that represent the two skins.  
 DEFORM defines an initial deformation. Used to represent prestress in the tie-down cables.  
 EIGR specifies the range of natural frequencies to be computed.  
 GRAV specifies gravity type loads to represent the various types of loads on the shelter.  
 GRID defines the identification number of a grid point and specifies its coordinates.  
 LOAD defines combinations of the gravity loads given on the GRAV cards that represent the various loads applied to the shelter.  
 MAT1 specifies structural material properties.  
 MPC defines a linear equation between specified degrees of freedom.  
 PBAR defines beam properties for the BAR elements.  
 PQUAD1, }  
 PQUAD2, } define plate properties for the QUAD1, QUAD2, TRIA1 elements.  
 PTRIA1 }  
 PROD defines properties for the ROD element.  
 SEQGP Input data was produced by BANDIT, a program that is a pre-processor to NASTRAN. BANDIT resequences the original numbering of grid points to minimize matrix solution time, page 25.  
 SPC1 }  
 SPCADD } define boundary conditions.

## ANALYSIS RESULTS

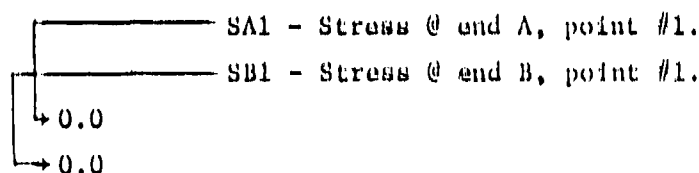
Samples of shelter analysis output data are shown on pages 27-33. Each page of the output is identified by the subcase label and the subcase number.

a. Displacement Vector, page 27, shows displacements of each grid point under the loading specified in the subcase shown at the top of the page. T1,T2, and T3 are translations, in inches, along the x-, y-, and z-axes, respectively. R1,R2, and R3 are rotations, in radians, about the x-, y-, and z-axes, respectively.

b. Load Vector, page 28, shows the loads at each grid point resulting from the applied gravity action. T1,T2, and T3 are loads acting along the x-, y-, and z-axes, respectively. R1,R2, and R3 are moments acting about the x-, y-, and z-axes, respectively.

c. Forces of Single-Point Constraint, page 29, show force reactions of the constrained grid points. T1,T2, and T3 are force reactions acting along the x-, y-, and z-axes, respectively. R1,R2, and R3 are moment reactions acting about the x-, y-, and z-axes, respectively.

d. Stresses in Bar Elements (BAR), page 32. NASTRAN provides for obtaining stresses at up to four points on the end cross-section of a bar element. The first column in this output gives element ID number. The next four columns show the stresses at the eight specified points for each bar element arranged as follows:



etc.

The sixth column shows the axial stress. The last two columns give maximum and minimum stresses at ends A and B. These stresses are obtained by adding the axial stress (col. 6) and the maximum positive bending stress at one of eight specified points to produce "MAX.", and the axial stress plus the highest negative bending stress for "MIN.".

e. Stresses in General Quadrilateral Elements (QUAD1), page 33. Columns 3, 4, and 5 show stresses in plate elements in the element

coordinate system. The plate element coordinate system in NASTRAN is established on CQUAD and CTRIA cards as follows: the origin is at the first grid point listed on the card. The x-axis goes through the second listed point. The y- and z-axes are then added according to the right-hand rule. Columns 6, 7, 8, and 9 show principal stresses as computed from the stresses in columns 3, 4, and 5. QUAD1 element ID numbers are listed in Column 1. Column 2 shows the distance from the neutral plane to the fibers at which the stress was requested. The fiber distance is in the element coordinate system.

#### RESULTS OF THE ANALYSIS

After the original shelter was modeled and analyzed, it was reinforced and the internal equipment and its supports were rearranged. The analysis process was then repeated on the modified shelter.

The reinforcements consisted mainly of additional floor and wall beams for equipment mounting and strengthened joints between the floor and the walls.

The finite element model was changed to reflect these modifications in the shelter and equipment configuration. These reinforcements changed the original finite element model by the shelter sufficiently to preclude accurate point-by-point comparison of stresses between the two shelters. However, for an analysis of a rail hump--the most severe of the tests--the average of the stresses in the internal floor beams was computed and found to decrease by 20% after reinforcements to the shelter were incorporated in the finite element model.

#### ACKNOWLEDGMENTS

We acknowledge the help of Suzanne Wybraniec who took an active interest in preparing and checking the NASTRAN input data and tabulating the stress output. Michael Golden wrote a computer program that expedited punching the large number of data cards needed to model the shelter. We also thank Dr. S. K. Dhir for his interest and helpful suggestions.

APPENDIX  
NASTRAN SAMPLE\* DATA AND OUTPUT

\*NOTE: The complete NASTRAN output set is available from  
Dr. C. Blackmon, Code K21, NSWC, Dahlgren, Virginia 22448.

NASTRAN EXECUTIVE CONTROL DECK ECHO

ID COMPUTER SHELTER, CASH 1844  
DIAG 1.8.19.22  
TIME :90  
\$SEQUENCE YES  
\$GRID 400  
\$CONFIG 6  
\$PRINT MAX  
CHKPNT YES,DISK  
APP DISPL  
SOL 1.0  
ALTER B3  
PARAM //C.N.SYST/C.N./C.N.58/C.N.2 \$  
ALTER B4  
PARAM //C.N.SYST/C.N./C.N.58/C.N.0 \$  
ENDALTER  
CEND

CASE CONTROL DECK ECHO

CARD COUNT	
1	MAXLINES=1000000
2	MPC=1
3	STRESS=ALL
4	DISP=ALL
5	OLoad=ALL
6	SPCFORCES=ALL
7	ELFORCE=ALL
8	SUBCASE 1
9	LABEL=RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD
10	SPC=11215
11	LOAD=25
12	SUBCASE 2
13	LABEL=RAIL HUMP-OTHER END FORWARD-VERTICAL ACCELERATION UPWARD
14	SPC=11315
15	LOAD=12
16	SUBCASE 3
17	LABEL=RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION DOWNWARD
18	SPC=11112
19	LOAD=45
20	SUBCASE 4
21	LABEL=RAIL HUMP-OTHER END FORWARD-VERTICAL ACCELERATION DOWNWARD
22	SPC=11113
23	LOAD=14
24	SUBCASE 5
25	LABEL= HELIG LIFT - 4 G
26	SPC=116
27	LOAD=3
28	SUBCASE 6
29	LABEL= DROP TEST - 20 G
30	SPC=110
31	LOAD=4
32	BEGIN BULK

\*\*\* USER INFORMATION MESSAGE 207, BULK DATA NOT SORTED.XSORT WILL RE-ORDER DECK.



CARD	COUNT	1	2	3	4	5	6	7	8	9	10
1751-	1751-	CBAR	1179275	602	1179364	1179337	-1.0	0	1.0	1	2078
1752-	1752-	+	2078		-1.70000	0.00000	0.00000	-1.70000	0.00000	0.00000	2078
1753-	1753-	CONM2	1		1	1	1	1	1	1	1
1754-	1754-	CONM2	2		2	2	2	2	2	2	2
1755-	1755-	CONM2	3		3	3	3	3	3	3	3
1756-	1756-	CONM2	4		4	4	4	4	4	4	4
1757-	1757-	CONM2	5		5	5	5	5	5	5	5
1758-	1758-	CONM2	6		6	6	6	6	6	6	6
1759-	1759-	CONM2	7		7	7	7	7	7	7	7
1760-	1760-	CONM2	8		8	8	8	8	8	8	8
1761-	1761-	CONM2	9		9	9	9	9	9	9	9
1762-	1762-	CONM2	10		10	10	10	10	10	10	10
1763-	1763-	CONM2	11		11	11	11	11	11	11	11
1764-	1764-	CONM2	12		12	12	12	12	12	12	12
1765-	1765-	CONM2	13		13	13	13	13	13	13	13
1766-	1766-	CONM2	14		14	14	14	14	14	14	14
1767-	1767-	CONM2	15		15	15	15	15	15	15	15
1768-	1768-	CONM2	16		16	16	16	16	16	16	16
1769-	1769-	CONM2	17		17	17	17	17	17	17	17
1770-	1770-	CONM2	18		18	18	18	18	18	18	18
1771-	1771-	CONM2	19		19	19	19	19	19	19	19
1772-	1772-	CONM2	20		20	20	20	20	20	20	20
1773-	1773-	CONM2	21		21	21	21	21	21	21	21
1774-	1774-	CONM2	22		22	22	22	22	22	22	22
1775-	1775-	CONM2	23		23	23	23	23	23	23	23
1776-	1776-	CONM2	24		24	24	24	24	24	24	24
1777-	1777-	CONM2	25		25	25	25	25	25	25	25
1778-	1778-	CONM2	26		26	26	26	26	26	26	26
1779-	1779-	CONM2	27		27	27	27	27	27	27	27
1780-	1780-	CONM2	28		28	28	28	28	28	28	28
1781-	1781-	CONM2	29		29	29	29	29	29	29	29
1782-	1782-	CONM2	30		30	30	30	30	30	30	30
1783-	1783-	CONM2	31		31	31	31	31	31	31	31
1784-	1784-	CONM2	32		32	32	32	32	32	32	32
1785-	1785-	CONM2	33		33	33	33	33	33	33	33
1786-	1786-	CONM2	34		34	34	34	34	34	34	34
1787-	1787-	CONM2	35		35	35	35	35	35	35	35
1788-	1788-	CONM2	36		36	36	36	36	36	36	36
1789-	1789-	CONM2	37		37	37	37	37	37	37	37
1790-	1790-	CONM2	38		38	38	38	38	38	38	38
1791-	1791-	CONM2	39		39	39	39	39	39	39	39
1792-	1792-	CONM2	40		40	40	40	40	40	40	40
1793-	1793-	CONM2	41		41	41	41	41	41	41	41
1794-	1794-	CONM2	42		42	42	42	42	42	42	42
1795-	1795-	CONM2	43		43	43	43	43	43	43	43
1796-	1796-	CONM2	44		44	44	44	44	44	44	44
1797-	1797-	CONM2	45		45	45	45	45	45	45	45
1798-	1798-	CONM2	46		46	46	46	46	46	46	46
1799-	1799-	CONM2	47		47	47	47	47	47	47	47
1800-	1800-	CONM2	48		48	48	48	48	48	48	48

CARD	COUNT	1	2	3	4	5	6	7	8	9	10
2001-	211	COUAD2	37	90121	90131	10131	10121				
2002-	212	COUAD2	37	99321	99331	19331	19321				
2003-	213	COUAD2	37	1179321	1179331	1089331	1089321				
2004-	262	CRIGD1	4	7							
2005-	263	CRIGD1	15	18							
2006-	264	CRIGD1	1	4							
2007-	48	CRIGD2	25	780122	12345	780146	12345	780160	12345	+CRD11	
2008-	940121	+CRD11	2	940143	2	940164	2	239364	12345	+CRD21	
2009-	49	CRIGD2	309343	239321	12345	239343	12345	239364	12345		
2010-	349322	+CRD21	2	349343	2	349364	2				
2011-	31	CROD	50	31	10187						
2012-	32	CROD	50	32	19387						
2013-	33	CROD	50	33	1170187						
2014-	34	CROD	50	34	1179387						
2015-	51	CROD	50	51	10187						
2016-	52	CROD	50	52	19387						
2017-	57	CROD	50	57	1170187						
2018-	58	CROD	50	58	179387						
2019-	324	CTRIA1	407	10121	10131	10821					
2020-	339	CTRIA1	407	10131	10143	10843					
2021-	531	CTRIA1	407	10131	10843	10821					
2022-	3672	CTRIA1	407	13364	13377	14277					
2023-	4068	CTRIA1	407	13364	14277	14764					
2024-	4572	CTRIA1	407	14277	14764	14777					
2025-	4872	CTRIA1	407	14764	14777	15277					
2026-	5366	CTRIA1	407	14764	15277	16064					
2027-	5772	CTRIA1	407	15277	16077	16064					
2028-	8931	CTRIA1	407	18621	18643	19331					
2029-	9124	CTRIA1	407	18621	19331	19321					
2030-	9139	CTRIA1	407	18643	19343	19331					
2031-	11208	CTRIA1	407	12101	10821	10901					
2032-	12014	CTRIA1	407	12101	10821	12321					
2033-	12908	CTRIA1	407	12101	13321	13301					
2034-	16508	CTRIA1	407	16001	16021	17001					
2035-	17114	CTRIA1	407	17001	16021	18621					
2036-	18008	CTRIA1	407	17001	18621	18601					
2037-	30068	CTRIA1	407	10164	90164	10177					
2038-	30083	CTRIA1	407	10177	90187	10187					
2039-	30387	CTRIA1	611	10187	90187	10887					
2040-	31887	CTRIA1	611	10887	92487	12487					
2041-	33000	CTRIA1	112	12901	13301	92901					
2042-	33087	CTRIA1	611	12487	92487	14287					
2043-	34200	CTRIA1	112	13301	14701	94701					
2044-	34587	CTRIA1	611	14287	94787	14787					
2045-	34887	CTRIA1	611	14787	94787	15287					
2046-	35100	CTRIA1	112	14701	16001	94701					
2047-	36306	CTRIA1	112	16001	16501	96501					
2048-	36487	CTRIA1	611	15287	97087	17087					
2049-	37587	CTRIA1	611	17087	97087	18687					
2050-	39187	CTRIA1	611	18687	99387	19387					

SORTED BULK DATA ECHO											
CARD	COUNT	1	2	3	4	5	6	7	8	9	10
2201-	CTRIA1	1159379	407	1139387	1179354	1179387					
2202-	CTRIA1	1170224	407	1170121	1170131	1170821					
2203-	CTRIA1	1170239	407	1170131	1170143	1170843					
2204-	CTRIA1	1170431	407	1170131	1170843	1170821					
2205-	CTRIA1	1171109	407	1170801	1170821	1172101					
2206-	CTRIA1	1171528	407	1170821	1170843	1173321					
2207-	CTRIA1	1171553	407	1170843	1170854	1173352					
2208-	CTRIA1	1171576	407	1170854	1170897	1173379					
2209-	CTRIA1	1172115	407	1170821	1173321	1172101					
2210-	CTRIA1	1172438	407	1170843	1173352	1173321					
2211-	CTRIA1	1172465	407	1170864	1173379	1173352					
2212-	CTRIA1	1172484	407	1170887	1173387	1173379					
2213-	CTRIA1	1172908	407	1172131	1173301	1173321					
2214-	CTRIA1	1175421	407	1176121	1174721	1176143					
2215-	CTRIA1	1175443	407	1176143	1174721	1174752					
2216-	CTRIA1	1175448	407	1176143	1174752	1176152					
2217-	CTRIA1	1176407	407	1176101	1176121	1177001					
2218-	CTRIA1	1177038	407	1176121	1176143	1178643					
2219-	CTRIA1	1177048	407	78643	1176143	1176152					
2220-	CTRIA1	1177055	407	76152	1176179	1178664					
2221-	CTRIA1	1177084	407	1176179	1176187	1178687					
2222-	CTRIA1	1177314	407	1176121	1178621	1177001					
2223-	CTRIA1	1177928	407	1176121	1178621	1178643					
2224-	CTRIA1	1177953	407	1176152	1178664	1178643					
2225-	CTRIA1	1177976	407	1176179	1178654	1178687					
2226-	CTRIA1	1178408	407	1177001	1178601	1178621					
2227-	CTRIA1	1178931	407	1178621	1178643	1179331					
2228-	CTRIA1	1179124	407	1178621	1179321	1179331					
2229-	CTRIA1	1179139	407	1178643	1179343	1179331					
2230-	DEFORM	1	51	-042	52	-042					
2231-	DEFORM	1	57	-042	58	-042					
2232-	EIGR	15	INV	0.0	15.	3				1.E-3	+EIGR15
2233-	+EIGR15		MAX								
2234-	GRAV	1		386.76	30.	0.0					RAIL
2235-	GRAV	2		386.76	0.0	0.0					HUMP
2236-	GRAV	3		386.76	0.0	0.0					4G
2237-	GRAV	4		386.76	0.0	0.0					20G
2238-	GRAV	5		386.76	-30.	0.0					-30 >
2239-	GRID	1		219.10	71.85	43.64					
2240-	GRID	2		213.00	91.50	28.47					
2241-	GRID	3		189.50	91.50	22.47					
2242-	GRID	4		194.00	73.00	20.97					
2243-	GRID	6		164.50	77.50	70.97					
2244-	GRID	7		144.60	71.57	36.93					
2245-	GRID	8		105.75	79.22	28.33					
2246-	GRID	9		76.50	80.75	39.97					
2247-	GRID	13		22.85	75.00	38.34					
2248-	GRID	14		3.00	46.50	66.97					
2249-	GRID	15		24.90	23.00	26.07					
2250-	GRID	16		35.00	5.00	67.97					

1.E-3 +EIGR15  
RAIL  
HUMP  
4G  
20G  
-30 >

CARD	COUNT	1	2	3	4	5	6	7	8	9	10
2601-	GRID	1174701	232.940	46.3750	.0000						
2602-	GRID	1174721	232.940	46.3750	20.4700						
2603-	GRID	1174752	232.940	46.3750	51.3500						
2604-	GRID	1176101	232.940	60.2500	.0000						
2605-	GRID	1176121	232.940	60.2500	20.4700						
2606-	GRID	1176143	232.940	60.2500	42.8500						
2607-	GRID	1176152	232.940	60.2500	51.3500						
2608-	GRID	1176179	232.940	60.2500	78.3500						
2609-	GRID	1176187	232.940	60.2500	86.7200						
2610-	GRID	1176501	232.940	64.5300	.0000						
2611-	GRID	1177001	232.940	69.78	.0						
2612-	GRID	1178601	232.940	85.7500	.0000						
2613-	GRID	1178621	232.940	85.7500	20.4700						
2614-	GRID	1178643	232.940	85.7500	42.8500						
2615-	GRID	1178664	232.940	85.7500	63.8500						
2616-	GRID	1178687	232.940	85.7500	86.7200						
2617-	GRID	1179301	232.940	92.9400	.0000						
2618-	GRID	1179321	232.940	92.9400	20.4700						
2619-	GRID	1179331	232.940	92.9400	30.7200						
2620-	GRID	1179343	232.940	92.9400	42.8500						
2621-	GRID	1179364	232.940	92.9400	63.8500						
2622-	GRID	1179387	232.940	92.9400	86.7200						
2623-	LOAD	12	1.	1	1.						
2624-	LOAD	14	1.	1	1.						
2625-	LOAD	25	1.	1.	1.						
2626-	LOAD	45	1.	1.	1.						
2627-	MAT1	1	10.2+6	3.83+6							
2628-	MAT1	30	10.2+6	3.8+6							
2629-	MAT1	50	3.+7								
2630-	MAT1	112	10.2+6	3.83+6							
2631-	MPC	1	12101	1	.4281	12901	1	-1.			+MC01
2632-	MPC	1	12101	2	.4281	12901	2	-1.			+MC09
2633-	MPC	1	12101	3	.4281	12901	3	-1.			+MC02
2634-	MPC	1	17001	1	.4281	16501	1	-1.			+MC03
2635-	MPC	1	17001	2	.4281	16501	2	-1.			+MC11
2636-	MPC	1	17001	3	.4281	16501	3	-1.			+MC04
2637-	MPC	1	1172101	1	.4281	1172801	1	-1.			+MC05
2638-	MPC	1	1172101	2	.4281	1172801	2	-1.			+MC13
2639-	MPC	1	1172101	3	.4281	1172801	3	-1.			+MC06
2640-	MPC	1	1177001	1	.4281	1176501	1	-1.			+MC07
2641-	MPC	1	1176101	1	.5719						
2642-	MPC	1	1173301	1	.5719						
2643-	MPC	1	1173301	2	.5719						
2644-	MPC	1	1173301	3	.5719						
2645-	MPC	1	1172101	1	.5719						
2646-	MPC	1	1172101	2	.5719						
2647-	MPC	1	1172101	3	.5719						
2648-	MPC	1	1173301	1	.5719						
2649-	MPC	1	1177001	1	.5719						
2650-	MPC	1	1176101	1	.5719						

# Sorted Bulk Data Echo

CARD	1	2	3	4	5	6	7	8	9	10
COUNT	+	6005								+
2751-	+	6006	.34434	.1284						+
2752-	+	PBAR 404	1	.8125	.3597	.3597	.00403			+
2753-	+	6007								+
2754-	+	6008	.27							+
2755-	+	PBAR 405	1	.92187	.3866	.45696	.00515			+
2756-	+	6009								+
2757-	+	6010	.36477	.25013						+
2758-	+	PBAR 408	1	1.32	1.16426	.6163	.00629			+
2759-	+	6011								+
2760-	+	6012	.50525	.37519						+
2761-	+	PBAR 410	1	.6	.95	.1	.0			+
2762-	+	SW21								+
2763-	+	SW220.0	1.0							+
2764-	+	PBAR 411	1	.8288	.50453	.39228	.01259			+
2765-	+	SW41.875	-.962	.875	.663	-.875	.663	-1.875	-.962	+
2766-	+	SW65.42428	-.1284							+
2767-	+	PBAR 421	1	.8288	.50453	.39228	.01259	.0028		+
2768-	+	SW60								+
2769-	+	SW61.42438	-.1284							+
2770-	+	PBAR 502	1	2.08125	5.00418	1.07401	.02014			+
2771-	+	6043								+
2772-	+	6044	1.00967	.37852						+
2773-	+	PBAR 503	1	1.245	1.42138	.66255	.00572			+
2774-	+	6045								+
2775-	+	6046	.5336	.29181						+
2776-	+	PBAR 504	1	.92187	.3866	.45696	.00515			+
2777-	+	6047								+
2778-	+	6048	.36477	.25013						+
2779-	+	PBAR 511	1	2.355	4.928	.283	.04			+
2780-	+	SW41								+
2781-	+	SW420.3	0.7							+
2782-	+	PBAR 512	1	1.980	2.326	.256	.04			+
2783-	+	SW43								+
2784-	+	SW440.3	0.7							+
2785-	+	PBAR 601	1	2.4250	3.4660	1.5189	.02139			+
2786-	+	6049								+
2787-	+	6050	.9888	.6286						+
2788-	+	PBAR 602	1	1.7069	1.0836	1.2393	.01738			+
2789-	+	6051								+
2790-	+	6052	.6382	.5002						+
2791-	+	PBAR 603	1	1.81945	7.59992	7.64746	.0015			+
2792-	+	6053								+
2793-	+	6054	.53483	.67874						+
2794-	+	PBAR 604	1	.79645	.19735	3.48038	.00225			+
2795-	+	6055								+
2796-	+	6056	.18609	.34514						+
2797-	+	PQUAD1 110	1	.165	1	.44526	1	.165	1.5197-4	
2798-	+	PQUAD1 111	112	.290	1	1.0588	1	.290	1.5197-4	
2799-	+	PQUAD1 406	1	.080	1	.06280	1	.080	7.9291-5	
2800-	+									+

CARD	1	2	3	4	5	6	7	8	9	10
COUNT										
2801-	PQUAD1	610	1	.080	1	.06200	1	.080	5.9837-5	
2802-	PQUAD1	612	1	.080	1	.06200	1	.080	1.0274-4	
2803-	PQUAD2	37	1	.125	0.0					
2804-	PROD	50	50	.116						
2805-	PTRIA1	112	1	.165	1	.44526	1	.165	1.5197-4	
2806-	PTRIA1	113	112	.290	1	1.0568	1	.290	1.5197-4	
2807-	PTRIA1	305	1	.174	1	.12429	1	.174	7.9291-5	
2808-	PTRIA1	407	1	.080	1	.06200	1	.080	7.9291-5	
2809-	PTRIA1	611	1	.080	1	.06200	1	.080	5.9837-5	
2810-	SEOGP	4	313	7	306	8	243	9	162	
2811-	SEOGP	15	141	13	78	17	116	18	143	
2812-	SEOGP	19	189	20	301	21	195	28	232	
2813-	SEOGP	22	133	23	209	24	132	26	255	
2814-	SEOGP	27	182	29	340	25	218	309343	155	
2815-	SEOGP	30	231	6	288	14	20	16	84	
2816-	SEOGP	31	1	32	3	33	256	34	383	
2817-	SEOGP	51	2	52	4	--57	257	58	384	
2818-	SEOGP	61	49	62	10	63	263	64	316	
2819-	SEOGP	10101	61	10801	99	90801	96	90101	63	
2820-	SEOGP	10162	56	200122	82	203143	83	200164	85	
2821-	SEOGP	10177	24	740113	178	780122	135	780134	180	
2822-	SEOGP	10864	55	10843	98	10877	23	13343	97	
2823-	SEOGP	12101	93	92101	95	12901	100	92901	94	
2824-	SEOGP	13301	62	14701	40	16001	39	314401	165	
2825-	SEOGP	13321	54	13364	53	13377	22	14721	51	
2826-	SEOGP	14287	15	14787	14	15287	13	17087	11	
2827-	SEOGP	14743	52	14764	50	14277	21	14777	19	
2828-	SEOGP	16021	31	16043	30	16364	29	15277	18	
2829-	SEOGP	16501	38	17001	37	97001	79	96501	80	
2830-	SEOGP	18601	36	98601	77	19301	28	99301	75	
2831-	SEOGP	18643	7	18621	9	18664	6	16077	5	
2832-	SEOGP	18677	8	1	368	2	362	3	320	
2833-	SEOGP	18687	25	90121	41	10121	60	10131	57	
2834-	SEOGP	90131	42	90143	43	10143	58	90164	44	
2835-	SEOGP	94701	21	204701	124	206501	122	207001	121	
2836-	SEOGP	99321	69	19331	33	19343	34	99343	67	
2837-	SEOGP	99331	68	19364	35	99364	66	169331	109	
2838-	SEOGP	169321	110	169343	108	169364	107	239331	113	
2839-	SEOGP	200157	86	310187	127	312487	128	314787	130	
2840-	SEOGP	200801	101	200101	64	202101	115	202901	123	
2841-	SEOGP	204787	89	94787	47	207087	88	97087	45	
2842-	SEOGP	208601	120	202301	76	310801	102	310101	92	
2843-	SEOGP	209387	70	239354	114	239364	74	239375	112	
2844-	SEOGP	239301	117	319301	118	349301	161	644401	271	
2845-	SEOGP	239321	72	239343	73	239364	74	319307	119	
2846-	SEOGP	239387	87	349387	131	349322	157	349333	156	
2847-	SEOGP	249375	71	319387	105	319375	106	349375	151	
2848-	SEOGP	310122	91	310143	125	310164	126	420122	103	
2849-	SEOGP	312101	142	312901	159	317001	163	316501	164	
2850-	SEOGP	317037	129	420187	170	422487	171	424787	172	

# SORTED BULK DATA ECHO

CARD	COUNT	1	2	3	4	5	6	7	8	9	10
2901-	SEOGP	1176121	359	117352	339	1174752	365	1178621	358		
2902-	SEOGP	1176143	366	1176152	377	1179331	361	19321	32		
2903-	SEOGP	1178601	249	1179301	328	424101	203	534101	230		
2904-	SEOGP	1179321	333	1178643	374	1178664	381	1179364	378		
2905-	SEOGP	1179343	375	1178687	379	1179387	382	1170131	267		
2906-	SPC1	1	5	169321	165331	169343	169364	690122	1010121	+SP31	
2907-	+SP31	1010131	1010143	1010164	1010175	740113					
2908-	SPC1	1	6	14	20	22	24	27	29	+SP21	
2909-	+SP21	30									
2910-	SPC1	1	6	61	62	63	64				
2911-	SPC1	1	456	1	4	6	7	8	9	+SP11	
2912-	+SP11	13	15	16	17	18	19	21	23+SP12		
2913-	+SP12	26	28	2	3						
2914-	SPC1	1	12456	31	32	33	34				
2915-	SPC1	1	23456	51	52	57	58				
2916-	SPC1	2	23	63	64						
2917-	SPC1	2	123	61	62						
2918-	SPC1	10	123	10801	90801	200801	310801	420801	530801	+ SPCS	
2919-	+ SPCS	640801	750801	860801	970801	1080801	1170801	18601	98601+	FOR	
2920-	+ FOR	208601	318601	428601	538601	648601	758601	868601	978601+	SKIDS	
2921-	+ SKIDS	1088601	1178601								
2922-	SPC1	11	23	10801	90801	200801	310801	420801	530801	+ SUPP	
2923-	+ SUPP	640801	750801	860801	970801	1080801	1170801	18601	98601+	RALE	
2924-	+ RALE	208601	318601	428601	538601	648601	758601	868601	978601+	HMP	
2925-	+ HMP	1088601	1178601								
2926-	SPC1	12	1	10101	10801	12901	13301	14701	16001	+ AC END	
2927-	+ AC END	16501	18601	19301							
2928-	SPC1	12	2	10101							
2929-	SPC1	13	1	1170101	1170801	1172801	1173301	1174701	1176101	+ OTHER	
2930-	+ OTHER	1176501	1178601	1179301							
2931-	SPC1	13	2	1170101							
2932-	SPC1	14	3	10187	19387	1179387	1170187			LIFT	
2933-	SPC1	15	123456	51	52	57	58			TI DMN	
2934-	SPC1	16	123456	31	32	33	34			LIFT	
2935-	SPCADD	21	2	1							
2936-	SPCADD	110	1	10							
2937-	SPCADD	116	1	16							
2938-	SPCADD	1215	12	15							
2939-	SPCADD	1315	13	15							
2940-	SPCADD	11112	1	11	12						
2941-	SPCADE	11113	1	11	13						
2942-	SPCADD	11215	1	12	15						
2943-	SPCADD	11315	1	13	15						
	ENDDATA										

## RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

## D I S P L A C E M E N T      V E C T O R

POINT ID.	TYPE	T1	T2	T3	R1	R2	R3
312101	G	-3.431700E-02	-9.687600E-02	1.221971E+00	-1.246282E-02	-6.488247E-04	-2.236601E-03
312487	G	-1.534341E-01	1.210732E+00	1.325923E+00	-9.304279E-03	-2.938899E-03	-1.529654E-03
312901	G	-3.276518E-02	-9.427322E-02	1.111686E+00	-1.591780E-02	-2.478344E-05	-8.639190E-04
314401	G	-2.773353E-02	-9.054270E-02	8.275973E-01	-2.066284E-02	2.038006E-03	2.126366E-04
314787	G	-1.169333E-01	1.210425E+00	1.022698E+00	-1.708334E-02	-4.111361E-03	-1.584143E-03
316501	G	-2.046335E-02	-8.891084E-02	3.989742E-01	-1.877502E-02	5.385406E-03	-1.489224E-03
317001	G	-1.452575E-02	-8.895806E-02	3.043134E-01	-1.686384E-02	5.459344E-03	-7.491630E-04
317087	G	-7.823700E-02	1.210691E+00	5.300346E-01	-2.443430E-02	-8.227764E-04	-1.879744E-03
318501	G	-5.435300E-03	-8.918445E-02	8.780690E-02	-1.326720E-02	2.591323E-03	-1.329720E-03
319301	G	-1.345437E-03	-8.896944E-02	-1.267641E-02	-1.403723E-02	3.040978E-03	-1.329268E-03
319307	G	7.284595E-03	-6.142890E-03	-1.334557E-02	-1.346598E-02	4.331475E-03	-2.048534E-03
319375	G	-5.295089E-02	9.636831E-01	-2.040252E-02	-1.788023E-02	3.488055E-03	-2.939171E-03
319387	G	-3.551945E-02	1.210815E+00	-2.029788E-02	-2.212742E-02	2.570391E-03	-1.357659E-03
319391	G	-1.517047E-03	-9.617621E-02	-2.688623E-02	-1.447973E-02	2.240331E-03	-1.706859E-03
319397	G	1.216694E-03	-1.859515E-02	-3.228444E-02	-1.139345E-02	1.979236E-03	-2.385856E-03
319398	G	-1.100588E-02	1.534376E-01	-4.295155E-02	-1.256550E-02	-1.371308E-03	-2.089201E-03
319399	G	-1.736706E-02	3.955632E-01	-4.637663E-02	-1.507463E-02	-1.133575E-03	-4.376938E-03
319399	G	-2.470772E-02	4.636120E-01	-4.744358E-02	-1.512452E-02	-6.428667E-04	-6.108126E-03
319399	G	-3.251955E-02	6.264921E-01	-4.681034E-02	-1.483167E-02	-1.073461E-03	-5.537412E-03
319399	G	-3.876104E-02	7.872694E-01	-4.431341E-02	-1.572736E-02	-1.139576E-03	-4.548563E-03
319399	G	-4.831455E-02	9.535015E-01	-3.783351E-02	-1.735052E-02	2.552854E-03	-2.545606E-03
319399	G	-6.694687E-02	1.324496E+00	-3.288099E-02	-2.283266E-02	2.136934E-03	-1.471825E-03
420101	G	-1.287866E-01	5.592747E-01	1.535930E+00	-1.475584E-02	-8.371609E-04	-1.288157E-03
420122	G	-9.842921E-02	2.058257E-01	1.542012E+00	-1.6163350E-02	-1.656137E-03	-2.719831E-03
420143	G	-1.287866E-01	5.592747E-01	1.535930E+00	-1.475584E-02	-8.371609E-04	-1.288157E-03
420164	G	-1.557685E-01	8.936385E-01	1.548228E+00	-1.555345E-03	-1.066392E-03	-2.491359E-03
420187	G	-1.795051E-01	1.162234E+00	1.548385E+00	-8.794426E-03	-1.098890E-03	-1.437206E-03
420801	G	-5.703652E-02	-1.308161E-01	1.125750E+00	-1.376305E-02	-9.575090E-04	-1.373322E-03
422101	G	-4.789347E-02	-1.284435E-01	1.249539E+00	-1.869120E-02	-5.1573581E-03	-4.999621E-04
422487	G	-1.475594E-01	1.178682E+00	1.384452E+00	-7.546662E-03	-2.321247E-03	-1.409949E-03
422901	G	-4.145613E-02	-1.236257E-01	1.125750E+00	-1.869120E-02	-5.1573581E-03	-4.999621E-04
424101	G	-1.136733E-01	1.176110E+00	1.101929E+00	-1.739415E-02	-3.202316E-03	-1.453811E-03
426501	G	-3.203689E-02	-1.242113E-01	2.983321E-01	-1.876574E-02	2.686528E-03	-1.298891E-03
427001	G	-2.631425E-02	-1.242732E-01	2.183329E-01	-1.436934E-02	2.757184E-03	-1.402210E-03
427037	G	-7.673939E-02	1.178124E+00	5.710963E-01	-2.691578E-02	-2.203031E-03	-1.670493E-03
428501	G	-6.724435E-03	-1.249539E-01	5.920771E-02	-1.025356E-02	2.605431E-03	-1.845575E-03
429301	G	-2.770144E-03	-1.234389E-01	-4.325759E-02	-1.06749E-02	1.298423E-03	-9.461613E-04
429322	G	-8.761490E-03	1.018849E-01	-4.439393E-02	-1.06749E-02	1.298423E-03	-9.461613E-04
429343	G	-2.448243E-02	3.624037E-01	-4.627259E-02	-1.432051E-02	-1.470704E-04	-6.541363E-03
429364	G	-3.832275E-02	7.009693E-01	-4.721249E-02	-1.784576E-02	1.022575E-03	-3.938017E-03
429375	G	-4.004970E-02	8.953371E-01	-4.677403E-02	-2.014345E-02	-4.470463E-04	-5.395932E-03
429387	G	-3.646544E-02	1.178465E+00	-5.007415E-02	-2.463308E-02	3.019657E-05	-3.72629E-03
530101	G	-7.681036E-02	-1.539298E-01	1.567079E+00	-1.340361E-02	-8.072585E-04	-1.111960E-03
530122	G	-1.037228E-01	1.651066E-01	1.567288E+00	-1.560142E-02	-1.438200E-03	-1.378364E-03
530143	G	-1.317665E-01	5.036317E-01	1.567288E+00	-1.560142E-02	-1.438200E-03	-1.378364E-03
530164	G	-1.546986E-01	8.543050E-01	1.563552E+00	-1.606188E-02	-8.847290E-04	-1.812065E-03
530187	G	-1.706271E-01	1.149859E+00	1.563552E+00	-8.705242E-03	-7.695942E-04	-1.306502E-03
530801	G	-6.838589E-02	-1.530485E-01	1.473923E+00	-1.356159E-02	-7.313547E-04	-8.910353E-04
532101	G	-5.820433E-02	-1.500081E-01	1.282583E+00	-1.673105E-02	-1.354891E-03	-2.685693E-04



## RAIL WUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

SUBCASE 1

## LOAD VECTOR

POINT ID.	TYPE	T1	T2	T3	R1	R2	R3
319387	G	-3.108672E+02	0.0	2.072448E+02	-1.095092E+02	1.485356E+02	-1.642638E+02
349301	G	-2.609621E+02	0.0	1.739747E+02	0.0	1.866386E+00	0.0
349307	G	-2.165979E+02	0.0	1.443996E+02	1.603347E+00	-4.221281E+00	2.405021E+00
349322	G	-1.381471E+02	0.0	9.203807E+01	0.0	-2.278011E+01	0.0
349333	G	-1.953770E+02	0.0	1.302513E+02	0.0	-1.800714E+01	0.0
349343	G	-1.339347E+02	0.0	8.928977E+01	0.0	-1.822409E+01	0.0
349354	G	-2.000849E+02	0.0	1.333899E+02	0.0	-1.844104E+01	0.0
343364	G	-1.092020E+02	0.0	7.280133E+01	0.0	-1.600714E+01	0.0
349375	G	-2.274402E+02	0.0	1.516268E+02	3.275644E+00	-5.301280E+01	4.913467E+00
349387	G	-3.576339E+02	0.0	2.384226E+02	-1.189730E+02	1.504202E+02	-1.784595E+02
420101	G	-7.069816E+02	0.0	4.713211E+02	0.0	2.976584E+01	0.0
420122	G	-5.950432E+02	0.0	3.965954E+02	0.0	0.0	0.0
420143	G	-6.499159E+02	0.0	4.332773E+02	6.085335E+01	-5.434128E+02	9.128002E+01
420164	G	-6.092075E+02	0.0	4.061384E+02	0.0	0.0	0.0
420187	G	-8.451272E+02	0.0	5.631181E+02	2.379459E+02	3.227440E+02	3.569189E+02
423801	G	-1.113792E+03	0.0	7.465279E+02	-2.9208E+02	2.924425E+02	-4.381338E+02
422101	G	-7.408521E+02	0.0	4.937681E+02	-2.423103E+02	-5.479757E+01	-3.634663E+02
422487	G	-5.288478E+02	0.0	-5.25652E+02	0.0	0.0	0.0
422901	G	-9.007096E+02	0.0	6.364731E+02	-9.367349E+01	-3.573699E+02	-1.405102E+02
424101	G	-1.063673E+03	0.0	7.091152E+02	0.0	9.200627E+01	0.0
424787	G	-6.495046E+02	0.0	4.330698E+02	0.0	4.787348E+02	0.0
426501	G	-2.23729E+03	0.0	1.495520E+03	1.885377E+02	5.452513E+01	2.828066E+02
427001	G	-7.059377E+02	0.0	4.705251E+02	2.861980E+02	-2.360498E+02	4.292969E+02
427087	G	-5.541974E+02	0.0	3.694549E+02	0.0	0.0	0.0
428601	G	-1.234273E+03	0.0	8.223485E+02	-5.633426E+01	1.797938E+02	-8.450140E+01
429301	G	-6.203040E+02	0.0	4.133360E+02	0.0	2.872638E+01	0.0
429322	G	-6.079345E+02	0.0	4.052897E+02	0.0	0.0	0.0
429343	G	-6.02002E+02	0.0	4.013335E+02	0.0	0.0	0.0
429364	G	-4.325112E+02	0.0	2.883408E+02	0.0	0.0	0.0
429375	G	-3.058463E+02	0.0	2.038975E+02	0.0	0.0	0.0
429387	G	-6.204227E+02	0.0	4.136151E+02	-2.291848E+02	4.815922E+02	-3.439271E+02
530101	G	-7.069816E+02	0.0	4.713211E+02	0.0	2.976584E+01	0.0
530122	G	-5.506605E+02	0.0	3.671070E+02	0.0	0.0	0.0
530143	G	-7.585615E+02	0.0	5.059677E+02	1.217067E+02	-1.086826E+03	1.825600E+02
530164	G	-6.063121E+02	0.0	4.042681E+02	0.0	0.0	0.0
530187	G	-8.501361E+02	0.0	5.667574E+02	2.379459E+02	3.227440E+02	3.569189E+02
530801	G	-1.048690E+03	0.0	6.991268E+02	-2.254289E+02	2.803552E+02	-3.381434E+02
532101	G	-6.695503E+02	0.0	4.463669E+02	-2.126804E+02	-6.688488E+01	-3.190206E+02
532487	G	-5.923455E+02	0.0	3.952303E+02	0.0	0.0	0.0
532901	G	-8.295079E+02	0.0	5.533719E+02	-9.367349E+01	-3.694572E+02	-1.405102E+02
534101	G	-1.063673E+03	0.0	7.091152E+02	0.0	9.200627E+01	0.0
534787	G	-7.193599E+02	0.0	4.795733E+02	0.0	2.393674E+02	0.0
536501	G	-1.944773E+03	0.0	1.295516E+03	3.770755E+02	-2.350105E+02	5.656132E+02
537061	G	-7.770395E+02	0.0	5.185253E+02	5.646799E+02	-2.239625E+02	8.470199E+02
537087	G	-5.950122E+02	0.0	3.966748E+02	0.0	0.0	0.0
538601	G	-1.226226E+03	0.0	8.174839E+02	-2.328208E+01	4.355100E+01	-3.492312E+01
539301	G	-7.121015E+02	0.0	4.747343E+02	0.0	3.018834E+01	0.0
539322	G	-5.945148E+02	0.0	3.963432E+02	0.0	0.0	0.0
539343	G	-5.832395E+02	0.0	3.988263E+02	0.0	0.0	0.0
539364	G	-6.047270E+02	0.0	4.031513E+02	0.0	0.0	0.0

# RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

SUBCASE 1

## FORCES OF SINGLE-POINT CONSTRAINT

POINT ID.	TYPE	T1	T2	T3	R1	R2	R3
1	G	0.0	0.0	0.0	1.519447E-22	4.447979E-23	4.030169E-23
2	G	0.0	0.0	0.0	3.683708E-23	-3.515788E-24	8.05857E-25
3	G	0.0	0.0	0.0	2.888234E-23	1.361726E-24	-9.815156E-24
6	G	0.0	0.0	0.0	5.543753E-23	-5.135622E-23	8.032999E-24
8	G	0.0	0.0	0.0	2.788435E-23	-1.413944E-23	6.988504E-24
9	G	0.0	0.0	0.0	2.642347E-23	-4.280845E-24	-1.026526E-24
13	G	0.0	0.0	0.0	1.201217E-22	1.473857E-23	2.165398E-23
14	G	0.0	0.0	0.0	0.0	0.0	-9.328127E-06
15	G	0.0	0.0	0.0	8.268149E-05	1.545262E+06	-2.634678E+06
16	G	0.0	0.0	0.0	3.169464E-25	3.192287E-24	3.292709E-23
17	G	0.0	0.0	0.0	6.055888E-23	-5.855013E-24	9.283368E-24
19	G	0.0	0.0	0.0	1.011156E-22	3.603296E-24	9.180990E-24
20	G	0.0	0.0	0.0	0.0	0.0	-7.520430E-08
21	G	0.0	0.0	0.0	6.999199E-25	-1.432398E-25	-8.121689E-26
22	G	0.0	0.0	0.0	7.503926E-25	-7.743020E-26	-1.378939E-07
23	G	0.0	0.0	0.0	0.0	0.0	-5.286033E-25
24	G	0.0	0.0	0.0	2.658011E-23	-2.176759E-24	-2.801517E-08
26	G	0.0	0.0	0.0	0.0	0.0	4.829779E-24
27	G	0.0	0.0	0.0	6.716883E-25	7.263280E-26	2.351590E-08
28	G	0.0	0.0	0.0	0.0	0.0	1.262247E-26
29	G	0.0	0.0	0.0	0.0	0.0	7.303242E-10
30	G	0.0	0.0	0.0	0.0	0.0	1.216449E-09
31	G	-5.820766E-11	0.0	0.0	0.0	0.0	0.0
32	G	8.185452E-11	-4.456524E-11	0.0	0.0	0.0	0.0
33	G	1.746236E-10	-2.910383E-11	0.0	0.0	0.0	0.0
34	G	0.0	-1.455192E-11	0.0	0.0	0.0	0.0
51	G	-1.923649E+04	0.0	-3.005745E+04	0.0	0.0	0.0
52	G	-1.570120E+02	0.0	-2.453347E+02	0.0	0.0	0.0
57	G	2.084387E+04	0.0	-3.259250E+04	0.0	0.0	0.0
58	G	-2.260986E+03	0.0	3.535330E+03	0.0	0.0	0.0
61	G	0.0	0.0	0.0	0.0	0.0	1.210719E-08
62	G	0.0	0.0	0.0	0.0	0.0	1.117587E-08
63	G	0.0	0.0	0.0	0.0	0.0	1.490116E-07
64	G	0.0	0.0	0.0	0.0	0.0	-2.682209E-07
10101	G	8.042356E+04	3.393314E+04	0.0	0.0	0.0	0.0
10801	G	9.685051E+04	0.0	0.0	0.0	0.0	0.0
12901	G	1.597964E+05	0.0	0.0	0.0	0.0	0.0
13301	G	-6.848198E+04	0.0	0.0	0.0	0.0	0.0
14701	G	1.974032E+04	0.0	0.0	0.0	0.0	0.0
16061	G	-2.899736E+04	0.0	0.0	0.0	0.0	0.0
16501	G	8.190112E+04	0.0	0.0	0.0	0.0	0.0
16601	G	1.311317E+04	0.0	0.0	0.0	0.0	0.0
19301	G	-8.268686E+03	0.0	0.0	0.0	0.0	0.0
19331	G	0.0	0.0	0.0	0.0	5.393123E+03	0.0
19343	G	0.0	0.0	0.0	0.0	-2.847193E+03	0.0
19364	G	0.0	0.0	0.0	0.0	1.108647E+04	0.0
1010131	G	0.0	0.0	0.0	0.0	3.843506E+02	0.0
1010143	G	0.0	0.0	0.0	0.0	7.451113E+03	0.0

## RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

SUBCASE 1

## FORCES IN BAR ELEMENTS (C B A R)

ELEMENT ID.	BEND-MOMENT END-A		BEND-MOMENT END-B		SHEAR		AXIAL FORCE	TORQUE
	PLANE 1	PLANE 2	PLANE 1	PLANE 2	PLANE 1	PLANE 2		
664797	-3.827823E+02	-3.456084E+03	4.511228E+02	-1.135149E+02	-8.339051E+01	-3.342569E+02	1.362752E+03	-7.345553E-01
660800	2.189264E+03	-2.588452E+03	-4.036272E+03	-5.652425E+03	2.857380E+02	1.392710E+02	-4.182961E+03	-4.142832E+01
662100	3.030066E+02	6.851416E+02	-3.607934E+02	-1.262401E+03	3.017273E+01	8.853829E+01	-1.843393E+03	-2.068955E+00
662930	-7.211806E+03	-1.455673E+03	1.025873E+03	2.707454E+03	-3.714400E+02	-3.193230E+02	-3.136241E+03	-6.250351E+00
669386	1.335382E+03	3.540976E+02	-6.752188E+02	-3.321437E+02	9.130995E+01	3.122029E+01	-3.199895E+03	-4.425172E-01
690053	1.716431E+02	-2.665282E+02	1.752495E+02	1.133246E+02	3.742335E+00	-2.713234E+01	1.754799E+02	-8.228394E-01
690367	1.192495E+02	2.344693E+02	-2.074293E+03	7.499505E+02	1.540731E+02	-3.617420E+01	-2.760116E+02	-3.045336E+00
690081	1.395034E+03	9.146159E+02	-2.474791E+02	1.328437E+03	1.339551E+02	3.277506E+01	-1.015123E+04	-3.452636E+01
690800	-4.113500E+03	-2.707015E+03	3.291833E+03	-3.028474E+03	-3.366270E+02	1.424812E+01	-1.015123E+04	-3.452636E+01
692900	-5.815110E+03	-9.692252E+02	3.147322E+03	1.639224E+03	-4.073833E+02	-1.276528E+02	-4.083899E+02	-5.209043E+00
694787	2.62509E+02	-5.002155E+02	7.382055E+02	-6.402858E+03	-2.161205E+01	2.683019E+02	-1.622739E+03	-1.68969E-01
696500	3.353760E+04	7.281476E+03	-1.082185E+04	-3.549334E+03	2.016338E+03	4.922641E+02	1.285927E+04	-1.208835E+01
697000	5.997269E+03	3.890945E+03	-6.940834E+03	1.165714E+02	5.880956E+02	1.715623E+02	9.433274E+03	-1.721861E+00
698000	4.926550E+03	1.894063E+02	-9.37765E+02	-5.702759E+02	2.665604E+02	3.453107E+01	-2.689935E+03	-1.514967E+00
699300	-1.071142E+03	-1.554749E+03	1.225535E+03	-8.65123E+02	-1.043944E+02	-3.155621E+01	-2.570655E+03	-9.670363E-01
699339	-1.121407E+02	2.501340E+02	-5.928837E+01	-2.962521E+02	-2.402380E+00	2.483573E+01	-4.416506E+02	-3.309128E-01
699366	-7.335715E+03	-1.633471E+03	5.697825E+03	3.285355E+02	-6.015246E+02	-8.918399E+01	-1.026219E+03	1.802387E+01
699367	-2.528435E+03	-7.987209E+02	2.358571E+03	-2.347122E+02	-2.238312E+02	-2.291003E+01	6.699319E+02	0.0
699374	8.930566E+01	-1.607356E+02	-8.387125E+01	7.369325E+01	-7.871649E+03	-1.460585E+01	1.356347E+03	0.0
709387	6.513722E+01	6.806463E+02	2.335815E+03	7.073749E+02	-2.238312E+02	1.460585E+01	-1.204524E+03	-1.065434E-01
710046	-1.780761E+02	-6.694237E+02	-1.642358E+03	-5.909256E+03	7.1599474E+02	6.70768E+02	1.631047E+04	-9.270134E+00
710075	1.623526E+03	-2.617632E+02	-2.745355E+01	-6.317295E+02	4.280703E+00	5.965342E+01	-4.964946E+02	-4.654809E-02
720087	5.167319E+02	4.421645E+02	-1.244797E+03	9.902944E+02	8.283341E+01	-1.385628E+02	-1.957135E+03	-3.365825E+00
720187	-1.792273E+03	-3.808772E+03	1.562449E+03	1.723555E+02	-1.335049E+02	1.365010E+01	-1.245311E+03	-4.630766E-01
726500	-4.210422E+02	-5.054565E+03	7.159335E+02	-1.623636E+03	1.660887E+02	2.551152E+01	-1.821359E+03	7.409774E-01
727000	2.362741E+02	1.441984E+03	-2.572477E+02	7.315193E+01	-2.090180E+02	1.035774E+03	-1.682284E+04	-1.568071E+01
730046	-1.045941E+03	7.641573E+01	1.288393E+03	4.767231E+01	-1.355195E+02	1.645301E+00	9.216789E+01	-2.181377E-01
730075	1.623526E+03	-3.622456E+02	-1.569443E+03	-8.095527E+01	-5.45045E+01	4.423745E+03	-3.627199E+02	4.630765E-01
750186	-1.014408E+03	-2.711611E+02	7.265200E+02	-6.337248E+03	-7.54035E+02	3.969016E+02	1.927395E+04	-1.026267E+01
751287	1.315199E+02	1.363566E+03	-1.015705E+02	-1.634937E+02	1.015437E+01	6.726372E+01	1.399690E+03	1.674447E+01
752500	4.718752E+02	-4.192671E+03	-2.932435E+03	-1.391151E+04	2.527328E+02	7.140938E+02	-8.493881E+02	3.586429E+00
753587	4.085019E+03	-1.267052E+04	-4.735271E+02	-1.286322E+04	5.614010E+02	2.380546E+01	-2.207747E+03	6.386042E+00
753800	-9.450041E+02	-9.259350E+03	3.33825E+02	8.365135E+03	-6.994432E+03	2.916438E+01	-4.535552E+03	2.898269E+00
755600	-3.33928E+02	-2.116878E+03	1.692424E+03	6.192424E+03	-6.994432E+03	2.916438E+01	-4.170038E+01	1.048655E+00
756700	-2.765216E+03	2.102100E+04	-4.705993E+03	1.748139E+04	-1.225980E+02	-3.334669E+02	-6.396947E+02	-8.465757E+01
758187	1.016933E+02	-1.01917E+03	3.377956E+02	6.242142E+03	-3.436973E+01	-9.932243E+02	4.102332E+03	-1.728037E+01
758300	3.386772E+03	8.389056E+03	-2.432936E+03	3.051635E+03	8.094255E+02	7.423311E+02	2.342069E+02	-2.947100E+00
759311	-1.169466E+03	1.272663E+03	3.377956E+02	6.242142E+03	-4.693046E+03	-2.171524E+01	2.342069E+02	-2.947100E+00
759332	-1.750551E+02	-1.218664E+03	-4.237235E+02	-2.501166E+03	6.153461E+01	9.320884E+01	2.786328E+02	-8.465757E+01
759353	9.039708E+02	-2.643991E+03	-7.036618E+02	-1.56592E+03	7.655394E+01	-5.134184E+01	2.374547E+03	7.381904E+00
759375	4.832205E+02	-8.450522E+02	-1.010976E+03	-5.373116E+02	6.533434E+01	-1.345607E+01	2.318092E+03	1.593966E+00
							2.786328E+02	-8.465757E+01
							2.342069E+02	-2.947100E+00
							3.945960E+03	2.560354E+00
							2.374547E+03	7.381904E+00
							2.786328E+02	-8.465757E+01
							2.318092E+03	1.593966E+00
							1.595123E+03	2.242121E+00
							1.543891E+03	2.126136E+00
							1.195067E+03	-5.231770E+00
							7.122229E+02	2.335414E-01

## SUBCASE 1

## R HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

## FORCES IN GENERAL QUADRILATERAL ELEMENTS (CQUAD1)

ELEMENT ID.	BEND-MOMENT X	BEND-MOMENT Y	TWIST-MOMENT	SHEAR X	SHEAR Y
900004	7.511792E+00	9.448358E+01	8.363576E+01	9.47073E+00	-3.339428E-03
900081	-3.060325E+01	1.267422E+02	-8.571990E+01	1.612322E+01	-5.069985E+01
911400	6.330822E+02	-4.996442E+02	-6.116241E+02	-8.113318E+01	8.766496E+01
912400	8.926099E+02	-4.023924E+02	-5.552952E+02	4.316210E+01	8.135015E+00
913587	-5.673358E+01	-2.166111E+02	1.685058E+00	-3.773568E+00	1.043887E+01
913700	-2.257118E+02	-7.559752E+02	-4.355238E+02	1.443978E+02	-3.680434E+01
915600	-2.841726E+03	-1.799966E+03	-2.273592E+02	2.171004E+02	-1.880305E+02
915887	-1.092877E+02	-2.683272E+03	4.351658E+01	-2.857242E+00	-3.089182E+00
916700	-2.762812E+03	-1.795377E+03	1.605482E+03	-3.978531E+02	-1.925420E+02
917800	-1.099943E+03	-6.262954E+02	1.626798E+02	4.433300E+01	-4.381444E+01
918187	-1.398979E+01	-2.917098E+01	6.726931E+01	1.907079E+00	-2.054289E+01
918900	-9.373641E+02	-5.472495E+02	2.956913E+01	-3.316219E+02	1.418979E+01
919311	6.261796E+01	5.407963E+01	7.628998E+01	-8.529372E+00	-9.032514E+00
919332	2.053344E+02	1.416886E+02	1.024091E+02	-9.385661E+00	9.102887E+00
919353	4.019272E+02	2.777482E+02	-9.870633E+01	-3.202831E+01	-3.844676E+01
919375	8.656388E+01	1.356796E+02	-1.155275E+02	1.093423E+00	1.137652E+01
970026	-3.267629E+01	-4.572031E+01	-1.189498E+01	2.264213E+00	1.488482E+01
970937	-1.293245E+02	-3.163442E+01	3.852020E+01	6.409290E+00	-2.533430E+01
1021287	3.431067E+01	7.522646E+01	-6.572355E+01	1.042033E+01	2.393251E+01
1021400	5.153472E+02	8.673499E+00	-2.057932E+02	-6.986042E+01	-9.414675E+01
1022400	1.052979E+03	3.062955E+02	-3.799994E+02	-6.993536E+01	9.950628E+01
1023587	-7.245091E+01	-1.568560E+02	-6.664681E+01	-2.868301E+00	-8.747457E+01
1023700	3.153403E+02	-8.525735E+02	-2.576543E+02	1.504759E+02	-5.166404E+01
1025600	-1.170312E+02	-1.909233E+02	5.792113E+01	-2.366574E+00	7.766287E+00
1025887	-5.970605E+02	-6.419706E+02	5.329279E+02	2.873835E+02	4.182089E+01
1026700	-1.906787E+03	-1.148761E+03	8.124905E+02	1.460926E+01	1.540498E+02
1028187	-3.086471E+01	1.449343E+00	8.492625E+01	5.201969E+00	-3.059704E+01
1028900	-1.150599E+03	-7.835939E+02	-4.588752E+01	-4.844518E+02	2.466329E+02
1029311	1.947158E+02	7.204636E+01	1.331225E+02	1.793399E+01	-1.178987E+00
1029375	3.280171E+01	-3.267335E+01	-1.151957E+01	-6.461510E+02	1.492827E+01
1040011	2.330233E+01	6.315194E+01	-1.722401E+02	-1.045306E+01	2.939297E+00
1040026	-1.267102E+01	-2.146355E+01	-1.029916E+01	8.232375E+00	5.211856E+00
1040037	5.697354E+01	4.460718E+01	1.159595E+01	2.269498E+01	-2.387236E+01
1040053	4.013225E+01	-4.123717E+01	2.035243E+01	4.970424E+00	1.284753E+00
1101287	-6.295175E+01	-3.940173E+00	-7.253630E+01	2.317580E+01	2.274009E+01
1103587	-9.921465E+01	-1.128459E+02	-6.263453E+01	5.251161E+01	-6.140690E+00
1105887	-1.792587E+02	-1.127368E+02	-3.646643E+01	1.831067E+01	3.439865E+00
1108187	-1.339356E+02	-1.255463E+01	1.705195E+02	5.395935E+01	-2.568069E+01
1120011	-1.658734E+01	1.679034E+01	-1.149001E+01	3.968146E+00	6.294901E+00
1120037	-1.200338E+02	-3.253950E+01	-2.269224E+01	1.061546E+01	1.746444E+01
1120053	-1.909334E+02	-2.748093E+01	-3.214435E+01	3.698696E+00	-7.108563E+00
1120400	1.072722E+02	-1.224742E+02	8.525735E+01	-2.521995E+01	5.378984E+01
1121400	1.324210E+02	-7.164911E+01	6.120795E+01	-2.540003E+01	6.755495E+01
1122400	4.673135E+02	6.764237E+01	-1.625231E+02	-6.116490E+01	6.705635E+01
1126700	4.975863E+02	-1.757533E+02	-1.352217E+02	4.215831E+02	-3.154060E+02
1127800	-1.456870E+03	-6.311817E+02	3.877474E+02	6.417036E+01	-2.824352E+02
1128900	-4.838056E+02	-1.025417E+02	1.344765E+03	-2.603683E+02	-1.114402E+02
1129311	1.012368E+02	-7.251788E+01	7.507553E+01	3.436812E+01	2.225560E+01

## RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

SUBCASE 1

ELEMENT ID.	STRESSES IN B A R E L E M E N T S			( C B A R )		SA-MIN		M.S.-I	
	SA1 SB1	SA2 SB2	SA3 SB3	SA4 SB4	AXIAL STRESS	SA-MAX SB-MAX	SA-MIN SB-MIN	M.S.-I M.S.-C	
200053	1.851646E+03 1.392094E+03	-9.846262E+02 -6.345367E+02	-1.220014E+03 -8.968710E+02	1.347244E+03 8.299499E+02	-7.323554E+02	1.119341E+03 6.597882E+02	-1.952320E+03 -1.629176E+03		
200075	1.686844E+03 2.356794E+03	-8.376754E+02 -1.008514E+03	-1.100010E+03 -3.253147E+02	1.124599E+03 1.699579E+03	-6.303488E+02	1.056495E+03 1.069330E+03	-1.730358E+03 -1.638862E+03		
200400	-2.734315E+03 5.309121E+03	-3.205906E+03 4.493539E+03	-3.205906E+03 4.493539E+03	5.002883E+03 -7.365527E+03	1.618000E+03	6.620888E+03 6.927121E+03	-1.597906E+03 -5.767627E+03		
201287	4.891426E+02 -1.090374E+03	-8.761096E+02 1.531004E+03	-6.777066E+02 1.591950E+03	5.550203E+02 -1.013238E+03	-5.219590E+02	3.554380E+01 1.069991E+03	-1.398069E+03 -1.612333E+03		
201400	-9.225924E+03 3.916987E+03	-2.999565E+03 4.477603E+03	-2.999565E+03 4.477603E+03	6.366913E+03 -7.012190E+03	-2.633155E+02	6.103497E+03 4.214288E+03	-9.489239E+03 -7.275505E+03		
202500	-1.116373E+04 9.038047E+02	-1.234127E+03 5.448131E+03	-1.294127E+03 5.448131E+03	4.563214E+03 -7.555245E+03	-1.150515E+03	3.412698E+03 4.297616E+03	-1.231425E+04 -8.706039E+03		
203587	-1.539025E+03 -1.241855E+03	2.181986E+03 2.042276E+03	2.242934E+03 1.755645E+03	-1.441586E+03 -1.316405E+03	4.382811E+01	2.286762E+03 2.086104E+03	-1.495197E+03 -1.272577E+03		
203800	-6.390721E+03 -6.927028E+02	7.925739E+02 -9.373577E+01	7.925739E+02 -9.373577E+01	5.500127E+02 3.012142E+02	-1.752862E+02	6.172877E+02 1.259280E+02	-6.566008E+03 -8.679890E+02		
205600	-5.525714E+02 6.627668E+03	6.457034E+02 -1.445226E+03	6.457034E+02 -1.445226E+03	-7.285634E+02 2.678026E+02	4.728457E+02	1.118549E+03 7.100513E+03	-2.558177E+02 -9.723802E+02		
205887	-1.147590E+03 -9.134263E+02	1.654635E+03 1.363262E+03	1.667152E+03 1.318068E+03	-1.039951E+03 -8.927086E+02	2.365771E+02	1.903729E+03 1.599839E+03	-9.110129E+02 -6.768492E+02		
206700	-7.837400E+02 6.928804E+03	-2.223295E+03 1.363386E+03	-3.223295E+03 1.363386E+03	4.533067E+03 -3.613111E+03	4.061341E+02	4.939201E+03 7.334939E+03	-2.817164E+03 -3.206977E+03		
207800	-4.003735E+03 1.728636E+03	-2.214702E+03 3.067266E+03	-2.214702E+03 3.067266E+03	3.990803E+03 -4.562146E+03	-9.270327E+02	3.063798E+03 2.140233E+03	-4.930768E+03 -5.489178E+03		
208187	-1.321494E+02 2.054771E+03	2.296443E+02 -2.820381E+03	1.644500E+02 -3.012438E+03	-1.457835E+02 1.874195E+03	4.973274E+00	2.346181E+02 2.059744E+03	-1.418102E+02 -3.007464E+03		
208900	-6.836720E+03 5.749296E+03	2.768234E+03 1.829200E+03	2.768234E+03 1.829200E+03	-1.934206E+03 -3.913755E+03	-8.270380E+02	1.511196E+03 4.922258E+03	-7.663758E+03 -4.740793E+03		
209385	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	3.670341E+03	3.670341E+03 3.670341E+03	3.670341E+03 3.670341E+03		
219100	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	-6.127751E+02	-6.127751E+02 -6.127751E+02	-6.127751E+02 -6.127751E+02		

## RAIL HUMP-A/C END FORWARD-VERTICAL ACCELERATION UPWARD

SUBCASE 1

ELEMENT ID.	FIBRE DISTANCE	STRESSES IN GENERAL QUADRILATERAL STRESSES IN ELEMENT COORD SYSTEM			PRINCIPAL STRESSES (ZERO SHEAR)			(COUADI) MAX		
		NORMAL-X	NORMAL-Y	SHEAR-XY	ANGLE	MAJOR	MINOR	SHEAR		
57800	0.0	-1.034442E+03	-2.614827E+03	-2.205414E+03	-35.4906	4.781203E+02	-4.187389E+03	2.332755E+03	2.332755E+03	2.332755E+03
	0.0	-1.034442E+03	-2.614827E+03	-2.205414E+03	-35.4906	4.781203E+02	-4.187389E+03	2.332755E+03	2.332755E+03	2.332755E+03
58900	0.0	-1.045620E+02	-1.500498E+02	-1.938751E+03	-44.6639	1.811578E+03	-2.066190E+03	1.938884E+03	1.938884E+03	1.938884E+03
	0.0	-1.045620E+02	-1.500498E+02	-1.938751E+03	-44.6639	1.811578E+03	-2.066190E+03	1.938884E+03	1.938884E+03	1.938884E+03
119326	0.0	1.291189E+02	1.280235E+03	-2.543813E+03	-51.3744	3.312821E+03	-1.903464E+03	2.608142E+03	2.608142E+03	2.608142E+03
	0.0	1.291189E+02	1.280235E+03	-2.543813E+03	-51.3744	3.312821E+03	-1.903464E+03	2.608142E+03	2.608142E+03	2.608142E+03
119337	0.0	-1.939235E+02	1.145375E+03	-2.448879E+03	-52.6583	3.013215E+03	-2.060764E+03	2.536990E+03	2.536990E+03	2.536990E+03
	0.0	-1.939235E+02	1.145375E+03	-2.448879E+03	-52.6583	3.013215E+03	-2.060764E+03	2.536990E+03	2.536990E+03	2.536990E+03
119353	0.0	5.935181E+02	8.977212E+02	-1.403828E+03	-48.0909	2.157708E+03	-6.663688E+02	1.412038E+03	1.412038E+03	1.412038E+03
	0.0	5.935181E+02	8.977212E+02	-1.403828E+03	-48.0909	2.157708E+03	-6.663688E+02	1.412038E+03	1.412038E+03	1.412038E+03
140011	0.0	-7.008064E+03	-4.619043E+03	-3.634937E+03	-54.0956	-1.987320E+03	-9.639787E+03	3.826233E+03	3.826233E+03	3.826233E+03
	0.0	-7.008064E+03	-4.619043E+03	-3.634937E+03	-54.0956	-1.987320E+03	-9.639787E+03	3.826233E+03	3.826233E+03	3.826233E+03
140053	0.0	9.055479E+02	-1.085516E+03	-1.088432E+02	-3.1151	9.114714E+02	-1.094440E+03	1.002955E+03	1.002955E+03	1.002955E+03
	0.0	9.055479E+02	-1.085516E+03	-1.088432E+02	-3.1151	9.114714E+02	-1.094440E+03	1.002955E+03	1.002955E+03	1.002955E+03
140075	0.0	3.090788E+03	8.002907E+01	4.268135E+02	7.9148	3.150126E+03	2.069061E+01	1.564718E+03	1.564718E+03	1.564718E+03
	0.0	3.090788E+03	8.002907E+01	4.268135E+02	7.9148	3.150126E+03	2.069061E+01	1.564718E+03	1.564718E+03	1.564718E+03
140400	0.0	-5.325845E+02	-8.225179E+03	-3.128334E+03	-19.5614	5.789883E+02	-9.336752E+03	4.957870E+03	4.957870E+03	4.957870E+03
	0.0	-5.325845E+02	-8.225179E+03	-3.128334E+03	-19.5614	5.789883E+02	-9.336752E+03	4.957870E+03	4.957870E+03	4.957870E+03
141287	0.0	3.494642E+03	7.235581E+02	8.651999E+02	15.9932	3.742623E+03	4.759773E+02	1.633323E+03	1.633323E+03	1.633323E+03
	0.0	3.494642E+03	7.235581E+02	8.651999E+02	15.9932	3.742623E+03	4.759773E+02	1.633323E+03	1.633323E+03	1.633323E+03
141400	0.0	-2.705322E+03	-6.455727E+03	-3.719162E+03	-31.5907	-4.181120E+02	-8.752937E+03	4.167413E+03	4.167413E+03	4.167413E+03
	0.0	-2.705322E+03	-6.455727E+03	-3.719162E+03	-31.5907	-4.181120E+02	-8.752937E+03	4.167413E+03	4.167413E+03	4.167413E+03
142500	0.0	-2.979670E+03	-6.002742E+03	-3.307010E+03	-32.7182	-8.551011E+02	-8.127311E+03	3.636105E+03	3.636105E+03	3.636105E+03
	0.0	-2.979670E+03	-6.002742E+03	-3.307010E+03	-32.7182	-8.551011E+02	-8.127311E+03	3.636105E+03	3.636105E+03	3.636105E+03
143587	0.0	1.925598E+03	7.717483E+02	4.793102E+02	19.8599	2.098727E+03	5.986194E+02	7.500536E+02	7.500536E+02	7.500536E+02
	0.0	1.925598E+03	7.717483E+02	4.793102E+02	19.8599	2.098727E+03	5.986194E+02	7.500536E+02	7.500536E+02	7.500536E+02
143800	0.0	-2.337368E+03	-5.768115E+03	-4.746035E+03	-35.0642	9.937488E+02	-9.099232E+03	5.046491E+03	5.046491E+03	5.046491E+03
	0.0	-2.337368E+03	-5.768115E+03	-4.746035E+03	-35.0642	9.937488E+02	-9.099232E+03	5.046491E+03	5.046491E+03	5.046491E+03
145600	0.0	-2.101727E+03	-4.370267E+03	-4.608836E+03	-38.3641	1.704859E+03	-8.176852E+03	4.940855E+03	4.940855E+03	4.940855E+03
	0.0	-2.101727E+03	-4.370267E+03	-4.608836E+03	-38.3641	1.704859E+03	-8.176852E+03	4.940855E+03	4.940855E+03	4.940855E+03
145887	0.0	1.302394E+03	6.420560E+02	5.589153E+02	29.7142	1.621376E+03	3.230733E+02	6.491515E+02	6.491515E+02	6.491515E+02
	0.0	1.302394E+03	6.420560E+02	5.589153E+02	29.7142	1.621376E+03	3.230733E+02	6.491515E+02	6.491515E+02	6.491515E+02

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